COLOMBO MUNICIPALITY.

1906, 7, 8, 1914-20.

XV.

Administration Report

1920

Public Health Department.

Report by Wm. MARSHALL PHILIP, M.B., D.P.H.,
Medical Officer of Health.

See MS [illegible]

Colombo:

S. M. JOHAR, MUNICIPAL PRINTER, CEYLON.

1921.

With the Compliments of the Medical
Officer of Health.

COLOMBO MUNICIPALITY.

Administration Report

1920

Public Health Department.

Report by Wm. MARSHALL PHILIP, M.B., D.P.H.,
Medical Officer of Health.

Colombo:
S. M. JOHAR, MUNICIPAL PRINTER, CEYLON.

1921.

ANNUAL REPORT, 1920.

——:o:——

CONTENTS.

Part I. VITAL STATISTICS.

1. Climatic conditions.
2. Population.
3. Marriages.
4. Births
5. Deaths.
6. Principal causes of deaths.
7. Infant mortality.
8. Infectious diseases.
9. Pulmonary diseases.
10. Influenza.
11. Diarrhœal diseases.
    - (*a*) Diarrhœa and enteritis.
    - (*b*) Dysentery.
12. Fevers.
    - (*a*) Enteric fever.
    - (*b*) Enteric in Colombo compared with other eastern towns.
    - (*c*) Enteric preventive measures.
13. Plague.
    - (*a*) Recrudescence and change in type.
    - (*b*) Plague in relation to age and sex.
    - (*c*) Plague in relation to grain trade.
    - (*d*) Plague in relation to climate.

    Mr. Bamford's Report.

    - (*e*) Plague in relation to season.
    - (*f*) Plague in relation to old underground drains.
    - (*g*) Rat plague.
    - (*h*) Anti-plague measures.
14. Measles.
15. Small-pox.
16. Vaccination.
17. Malaria.

Part II. ADMINISTRATION.

18. General sanitary work.
19. Latrines and cesspits.
20. Mosquito prevention.
21. Food inspection.
22. Cost of living.
23. Vagrancy.
24. Dairies and milk supply.
25. Bakeries.
26. Eating houses.
27. Aerated water factories.
28. Slaughter-house.
29. Laundries.
30. Cemeteries.
31. Dispensaries
32. Enteric hospital.
33. Staff changes.

Diagrams and Maps.

I. Biarth-rate, 1903—1920.
II. Death-rate, annual 1903—1920.
III. Death-rate, weekly 1920.
IV. Infant mortality. 1903—1920.
V. Pulmonary diseases, 1903—1920.
VI. Diarrhœal diseases, 1903—1920.
VII. Fevers, 1903—1920.
VIII. Human plague, spot map 1920.
IX. Rat plague, spot map 1920.
X. Plague cases.
XI. Mr. Bamford's diagrams

Annexures.

A. Bacteriologist's report.
B. City Analyst's report.
C. 40 Statistical tables.

ANNUAL REPORT, 1920.

———:o:———

1. **Climatic conditions.**—(see Statement I).—*Temperature.* The mean monthly temperature during the year was 80·5° which is only very slightly below the average. The hottest month was May with a mean temperature of 83·0°, while the coolest was December with a mean temperature of 78·6°.

RAINFALL.—The total rainfall recorded at the Colombo Observatory was 90·73 inches, which is 9·87 inches above the average. The wettest months were April with 14·77 inches, June with 17·44 inches, October with 15·27 inches, and November with 14·49 inches. The driest months were January and August with 0·83 and 0·94 inches respectively.

HUMIDITY.—The monthly mean humidity for the year was 81 per cent, as against the average of 80, and ranged from 79 per cent during the months January, February and December, to 84 per cent during June and November.

2. **Population.**—The population of Colombo as estimated at the middle of the year, in accordance with the previous intercensal rate of increase, was 278,664; but the provisional report on the recent Census shows that this is very considerably over the mark. Until however the final report of the Census is available, revision of the rates cannot be undertaken, and in this report therefore they are all reckoned on the basis of estimated population. For this reason the birth and death-rates, but especially the rates for wards and races must be accepted with reserve.

3. **Marriages.**—The best index of the economic state of a people is usually the marriage rate, which was described by Dr. Farr, the father of Vital Statistics, as "the barometer of prosperity." It is therefore unfortunate that the marriage rate for Colombo is not available, as the marriages recorded in the town are not separately tabulated; but are merged in those of the much wider and largely rural area which is included under the heading of "Colombo District." Even these however are of interest as the following statement shows :—

Marriages in Colombo District including Mohamedan Marriages, 1912–1920.

1912	...	4627
1913	...	5102
1914	...	4925
1915	...	4724
1916	...	4835
1917	...	4869
1918	...	4452
1919	...	3880
1920	...	4502

The marked drop in 1919 was doubtless caused by the rice crisis.

4. **Births.**—7,197 births were registered during the year, representing a birth-rate of 25·8 per 1,000, which is the highest recorded for 14 years.

As diagram I. shows the birth-rate rather markedly declined during the period of the war, the lowest point being reached in 1919, with rate of only 21·7 per 1,000. As the birth-rate is, next to the marriage-rate, probably the best index of prosperity, the great improvement in 1920 is encouraging; but as it is probably to some extent in the nature of a reaction after the depression caused by the war, it is improbable that it will be maintained at such a high level during succeeding years. So far as it goes however it is very satisfactory, especially as it occurred in conjunction with an exceptionally low infant mortality.

5. **Deaths.**—8,100 deaths were registered during the year, representing a crude death-rate of 29·1 per 1,000, as against a crude rate of 28·8 in the previous year. 2,689, or one-third of the total deaths registered, occurred in the Hospitals, and of these, 1,088 *i.e.*, 13·4 per cent of the total deaths and 40 per cent of the Hospital deaths, were non-residents of the town who came sick here for treatment. Exclusive of these deaths of non-residents the death-rate was 25·2 per 1,000, which is the same as the corrected rate for 1919.

6. **Principal Causes of Deaths.**—(For details see statements 10 and 14). Amongst the principal causes of deaths Pneumonia was as usual the chief, with 1,106 deaths; next comes Phthisis with 729 deaths; Diarrhœa and Enteritis with 605 deaths; Infantile Convulsions 590 deaths; Debility, 494 deaths; Enteric fever, 338 deaths; Influenza, 253 deaths; and Plague, 209 deaths.

Compared with the previous year there was a marked reduction in the mortality from Influenza and Pneumonia while Debility, Remittent and Simple continued fever, intestinal parasites, paralysis and rickets, all showed slight improvement. On the other hand, there was an increase in the mortality from Plague, Smallpox, Enteric fever, Diarrhœa, Dysentery, Infantile Convulsions, Hookworm, Syphilis and Tetanus. The most marked increases occurred in the case of Infantile Convulsions and Plague.

I

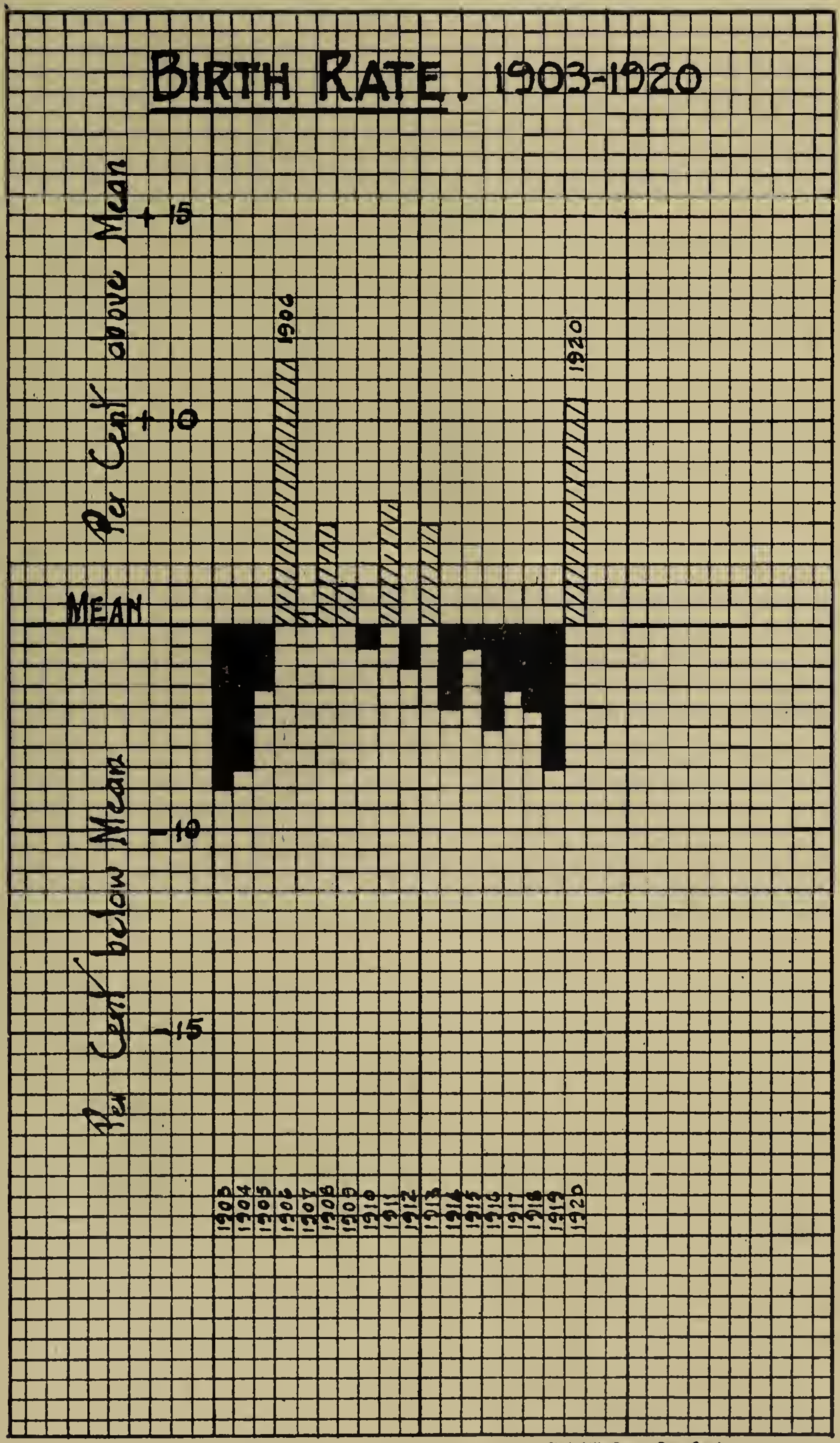
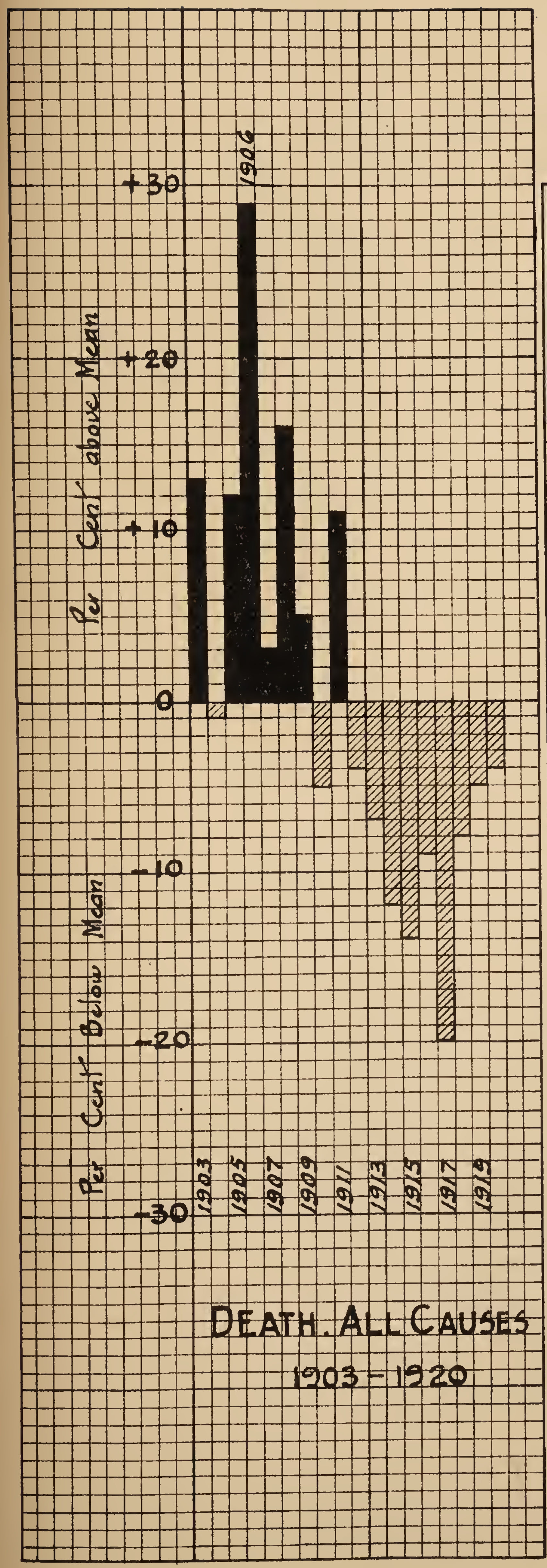


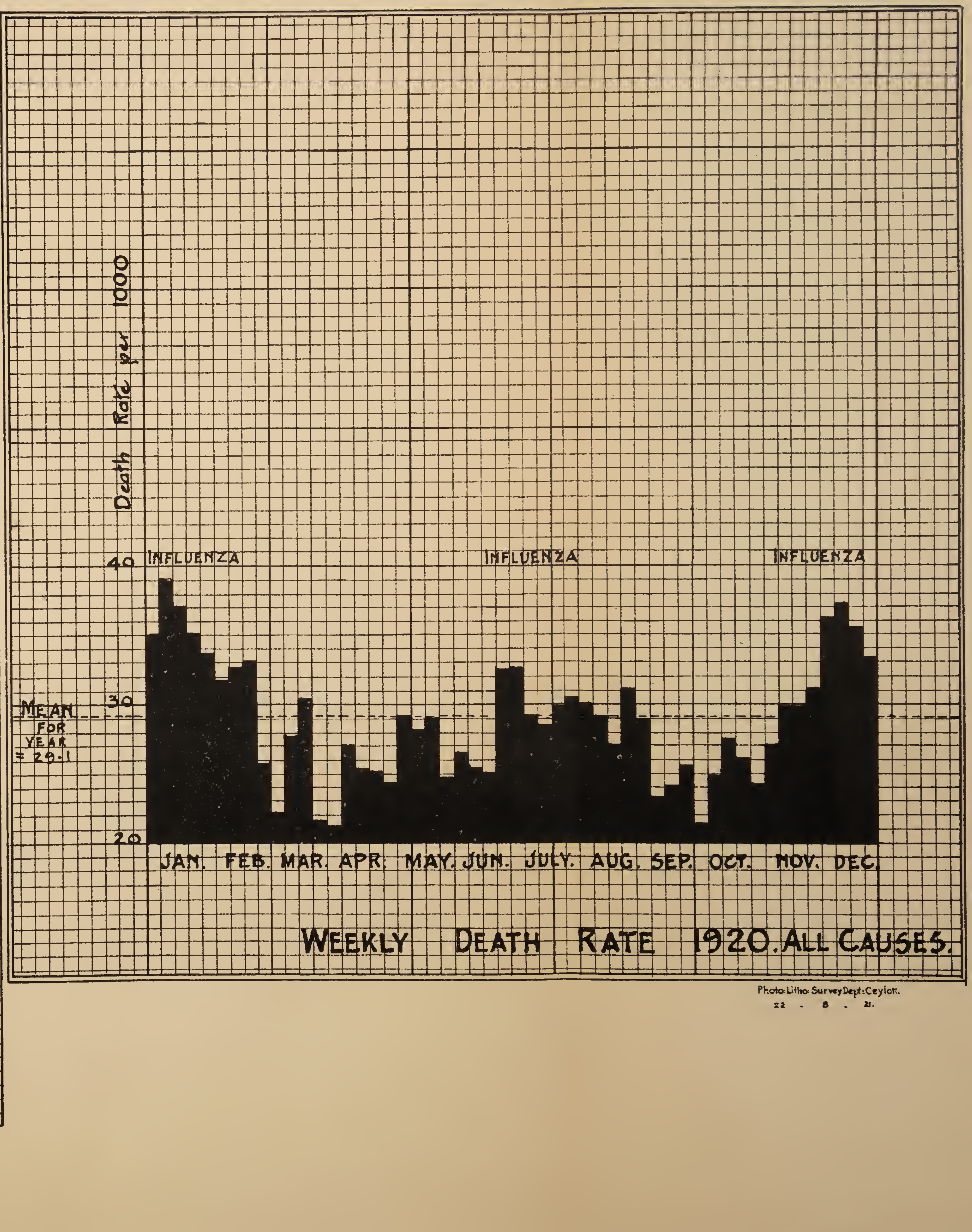
Photo Litho Survey Dept: Ceylon, 22.8.21.

II



DEATH. ALL CAUSES
1903 - 1920

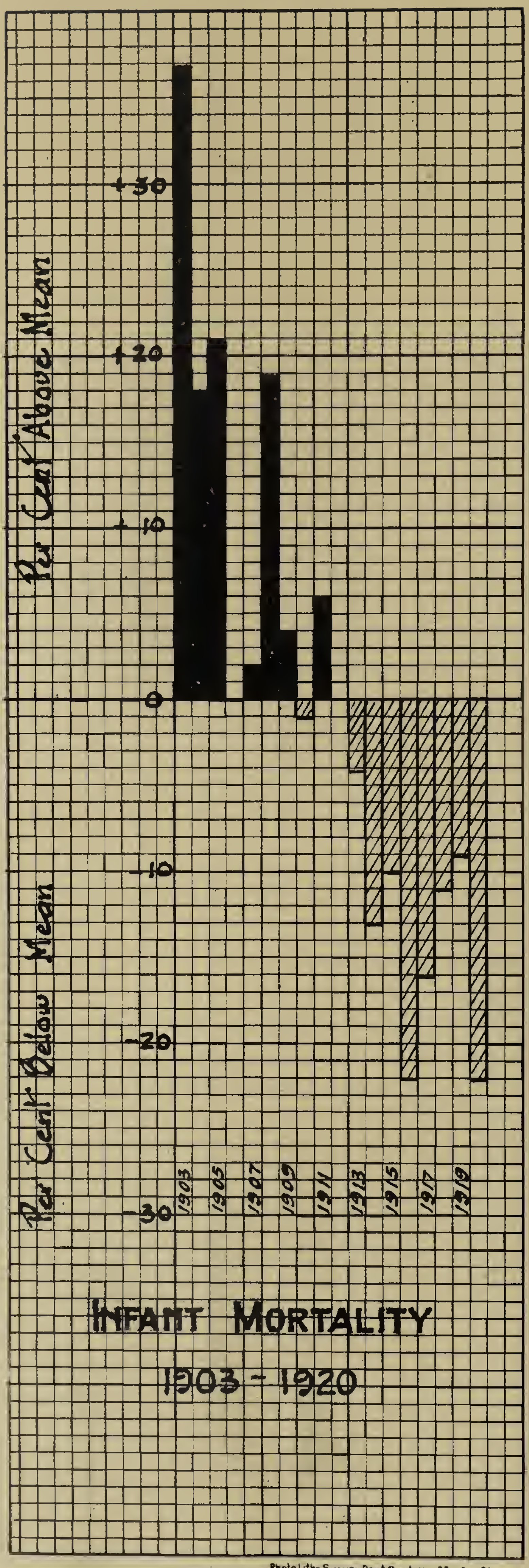
III



WEEKLY DEATH RATE 1920. ALL CAUSES.

Photo-Litho: Survey Dept: Ceylon.
22 - 8 - 21.

IV



INFANT MORTALITY
1903 - 1920

Photo Litho Survey Dept. Ceylon, 22 - 8 - 21.

V

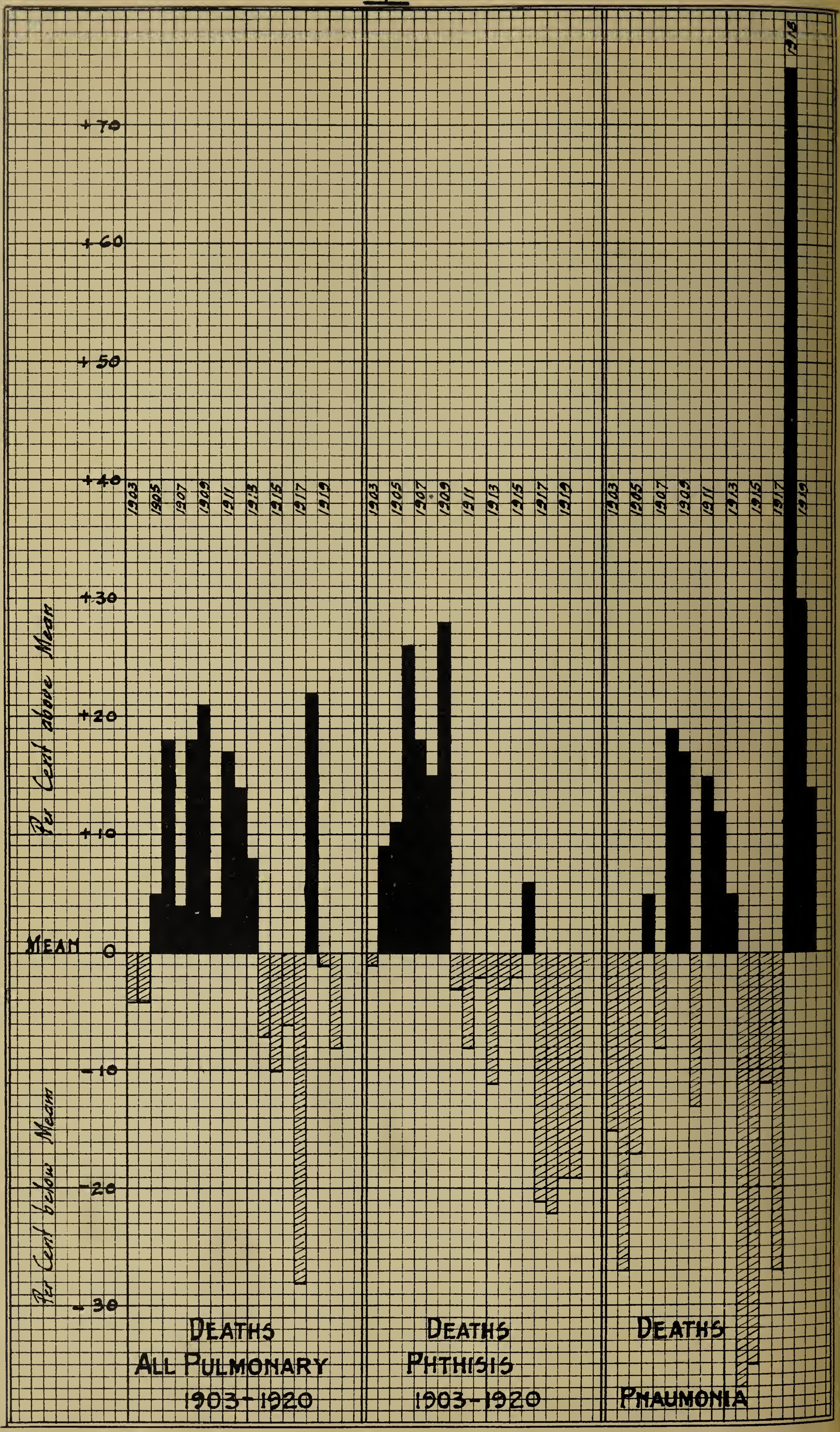


Photo:Litho: Survey Dept: Ceylon.
22 - 8 - 21.

VI

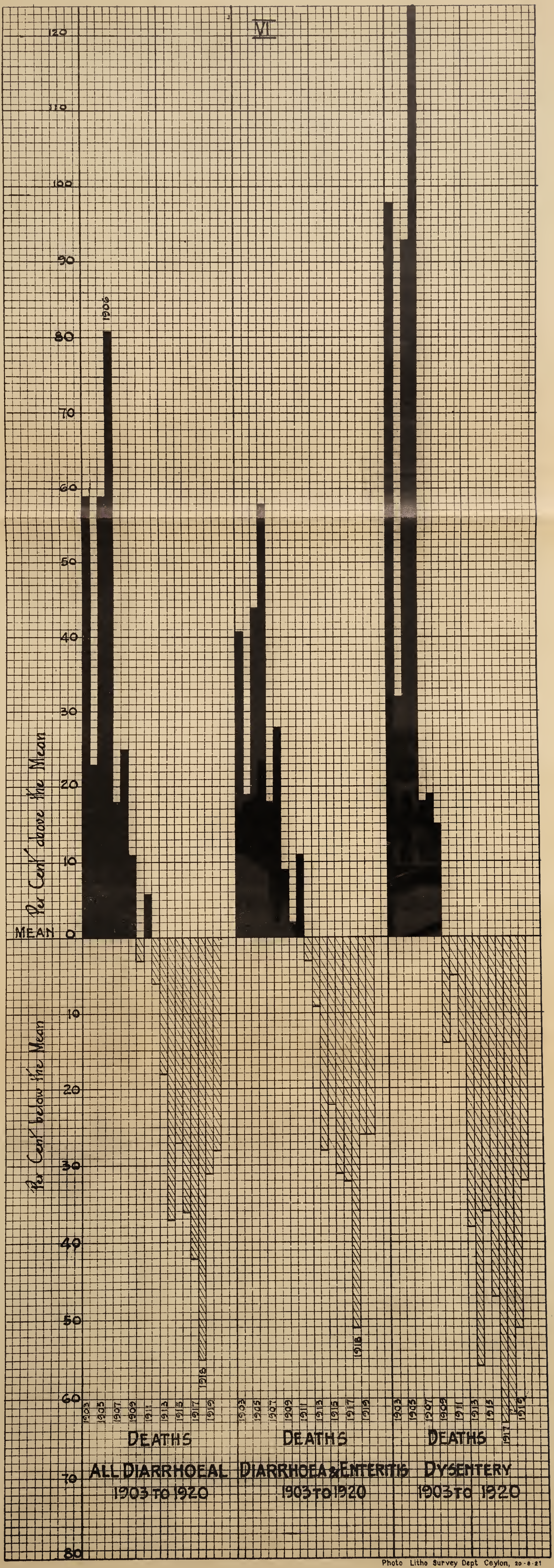


Photo Litho Survey Dept Ceylon, 20-8-21

7. **Infant Mortality.**—1,679 children died before completing their first year of life, representing an infant death-rate of 233 per 1,000 births registered, which is just below the previously lowest record of 234 in 1916.

The infant death-rate, after falling from 410 per 1,000 births in 1903 to 234 in 1916, a drop of 43 per cent in 14 years, rose 16 per cent during the 3 succeeding years to 271, as the result mainly of an increase in debility, from which it is deduced that the mothers and their infants had begun to feel the strain imposed by the greatly increased cost of living. The outbreak of Influenza in 1918 undoubtedly contributed towards the further increase of infant mortality during that and the succeeding year, while the improvement in the matter of the rice supplies combined with a general increase of wages and a reduction in the prevalence of Influenza probably accounts for the reduction of mortality in 1920 which was due chiefly to a reduction in the deaths from debility.

Had it not been for the fact that the mortality from convulsions and diarrhœa increased markedly during 1920, as the result doubtless of injudicious feeding with the now abundant and relatively cheap rice, the infant death-rate would have been considerably lower even than it was.

The highest mortality from convulsions occurred as usual amongst the Moors and Tamils, both of which races are backward in matters of domestic hygiene.

We have thus a clear indication of the need of instruction in such matters as the care and feeding of infants such as is provided in England by child welfare associations, and it is therefore encouraging that the initial steps towards the creation of such an organisation have already been voluntarily undertaken in Colombo,

8. **Infectious Diseases.**—There was an unusual prevalence of Infectious Diseases during the year a total of 4,809 cases in all being reported, representing an increase of 1,873 cases compared with the previous year. The total includes 520 cases from districts outside the town, and 67 cases from ships in the harbour, as against 398 outside and 65 harbour cases in 1919. In so far as the town cases only are concerned the following increases occurred in 1920. Measles increased by 663 cases, Enteric fever by 165 cases, Plague by 148 cases, Chickenpox by 144 cases, Phthisis by 76 cases, Smallpox by 72 cases, Simple continued fever by 21 cases, and Acute Diarrhœa by 3 cases. Diphtheria decreased by 6 cases, Influenza and Pneumonia are not notifiable diseases but as the deaths from these causes show, they both decreased considerably during 1920.

9. **Pulmonary Diseases.**—This group includes Phthisis, Pneumonia and Bronchitis, and was responsible for 1985 deaths or nearly a quarter of the total deaths from all causes.

(*a*) PHTHISIS.— *Cases*, 1,652 ; *deaths*, 729 ; *death-rate*, 2·62 per 1,000. This is practically the same as in 1919.

(*b*) PNEUMONIA.—*Deaths*, 1,106 ; *death-rate*, 3·97 per 1,000. This is a considerable improvement compared with 1919, due to a decline in the prevalence of Influenza.

(*c*) BRONCHITIS.—*Deaths*, 150 ; *death-rate*, 0·54 per 1,000. This is a slight increase compared with the previous year.

10. **Influenza.**—*Deaths*, 253, as against 421 in 1919. Influenza is not a notifiable disease and there is therefore no record of the total number of cases which occurred during the year, the death returns however indicate its continued although diminished prevalence during 1920. The wave which began in November, 1919, carried on until the middle of February, 1920, when it subsided, only to reappear however, as usual in two waves, one rather sharp one in July—August, and another rather milder one in November—December.

These waves of Influenza correspond in point of time with the rises in the general death-rate, and there can be no doubt this disease has been and still is a powerful factor in maintaining the rate of mortality in Colombo above the normal.

11. **Diarrhœal Diseases.**—This group which includes Diarrhœa, Enteritis and Dysentery, was responsible for 868 deaths, representing a death-rate of 3·11 per 1,000, which is a slight increase compared with 1919, the increase being caused by Dysentery,

(*a*) DIARRHŒA AND ENTERITIS.—*Deaths*, 605 ; *death-rate*, 2·17 per 1,000, as compared with 2·16 in 1919.

(*b*) DYSENTERY.— *Deaths*, 263 ; *death-rate*, 0·94 as compared with 222 deaths and a rate of 0·82 in 1919.

12. **Fevers.**—This group which includes Enteric fever, Simple Continued fever, Remittent and Intermittent fevers, caused 414 deaths, representing a death-rate of 1·48 per 1,000, as compared with 373 deaths and a rate of 1·38 in 1919. The increase in 1920 was caused entirely by Enteric fever, which is separately discussed below.

1

(*a*) ENTERIC FEVER.—*Cases*, 879 ; *deaths*, 338 ; *case mortality* 38·45 per cent ; *death-rate* 1·21 per 1,000 living.

The total includes 181 cases from districts outside the town, 21 cases from ships in the Harbour, and 104 Hospital cases the home addresses of which were unknown. Exclusive of these outside and untraced cases the Colombo total was 573 cases as against 421 in the previous year. The outside cases came from 74 different places scattered all over the Island from Jaffna to Hambantota, the largest numbers coming from the following districts, *viz* :— 12 cases from Kelaniya, 10 from Dehiwela, 9 from Peliyagoda, 8 from Kandana, 7 from Cotta, 6 from Hendala.

The very high fatality amongst the notified cases, *viz.* 38·45 per cent clearly indicates that a large number of non-fatal cases must have escaped notification, for even amongst the cases treated at the Enteric Hospital, which include a large proportion of severe attacks and are frequently admitted in the last stages of the disease, the case mortality was only 19·3 per cent.

Enteric fever in Colombo, after decreasing very markedly during the period 1907 to 1914, increased slightly during the 3 succeeding years, while in 1919 there was a rather severe outbreak during the second half of the year which was apparently attributable, as explained in the Report for that year, to the greatly increased facilities for direct contact which were afforded by the establishment of the rice depôts. Infection thus implanted amongst the population is, especially in a disease which like Enteric fever generates 'carriers,' extremely difficult to control or eradicate, and when as is the case here a large number of cases yearly escape notification, the difficulties are still further increased. As an illustration of the mischief that may be wrought by a single "carrier," the following series of cases which occurred during 1920 in connection with a large Boarding establishment, is interesting.

" On 9th November, two cases were notified from ~~this~~ a Boarding house. On 18th November, another case was notified. On 19th November, 2 more were notified, while on the same day a case was notified from the other end of the town, who it was found had been in the habit of having meals sent from this Boarding house although he did not reside there. Thus 6 cases in all were notified between 9th and 19th November, all of whom were found upon enquiry to have developed the disease and were therefore apparently infected at or about the same time, *i. e.* between 29th October, and 1st November.

" Enquiry showed that neither the water supply nor the milk supply were responsible, but the evidence pointed to a mass infection of the food served in and sent out from this house. None of the inmates of the house either were then or recently had been sick, so it was thought that there might be a "carrier" either amongst the boarders or more probably amongst the servants. Suspicion therefore fell upon one of the boarders who it was found had suffered from a mild attack of Enteric fever about 9 years previously. He, as well as the cook and 5 other servants who handled the food, were accordingly examined bacteriologically by Dr. Hirst with however negative results in every case. It was therefore decided to search further afield. It was ascertained that salads containing uncooked lettuce were frequently served at the table, and attention was accordingly turned in that direction. The supplies of vegetables were said to be generally purchased from one particular stall in the nearest public market. This stall was accordingly visited and was found to be in charge of a Sinhalese woman and her daughter E. N. a rather sickly looking girl of 16 years of age. This girl E. N. was at the time actually engaged in breaking up lettuces. Inspector LaBrooy who was conducting this part of the enquiry next visited the home of these people, where he ascertained that both E. N. and her younger sister had suffered from Enteric fever about 3 months previously, E. N. having been treated at the Enteric Hospital. On enquiry at the Hospital it was found that E. N. had been admitted as a patient on 24th July, and had suffered from a very severe attack of the disease, including 3 hæmorrhages. She was discharged cured on 7th October, after a stay of nearly 10 weeks in the Hospital. This girl, 3 other sisters and the mother were now all subjected to a bacteriological examination with the result that although all the others gave a negative result E. N. was found to be discharging enormous numbers of Enteric bacilli in her excreta; she was in fact an acute Enteric 'carrier', and was therefore the probable source from which the infection of all the series of cases mentioned had been derived.

" As this girl obviously was a very grave source of danger to the public so long as she remained infectious and was allowed to continue her employment of handling vegetables in the public market, her mother was, with some difficulty, induced to consent to her removal to the Enteric Hospital where she was treated for 3 weeks, and then discharged after being proved by bacteriological examination to be free from infection."

Before concluding this account it may be mentioned that a seventh case occurred in another house, in which it was found that the patient had been infected while staying at this same Boarding house, but had left the house prior to the appearance of symptoms. The facts in this case however could be explained by infection from one of the other cases as she was not infected until the others had developed the disease. Although it is possible, indeed probable that other cases in the town besides those mentioned may have been infected by this girl E. N. this could not be proved owing to the difficulty of obtaining information, and it is a matter of satisfaction that although a watch has since been kept, no further case has occurred which could be traced to infection from this girl. A recent further examination of this girl, (in May), has shown that she is still free from infection.

An interesting point about this series of cases is the fact 6 out of the total of 7 cases were recent arrivals in the Island, only one of whom had been inoculated against Enteric, and that one developed the disease in a very mild form.

In reviewing the facts of this outbreak it strikes one as rather extraordinary that notwithstanding the repeated warnings which have been issued by the Public Health Department, many people persist in eating uncooked vegetables, the source of which they know little or nothing about, and that at a time when Enteric fever is known to be unusually prevalent. Knowing as one does the inadequacy of the cleansing process to which lettuces and such like are subjected by even the best of servants, one must, even at the risk of being considered tedious, again insist that there is only one safe course to adopt here and that is not to eat uncooked vegetables at all, but especially lettuces, and it is with a view of enhancing this warning that the facts of this case have been recounted at such length. It is also hoped that this account will serve a useful purpose in inducing more people, but especially new comers, to take advantage of the unquestionably great, although it may be in some cases, not complete protection afforded by anti-typhoid inoculation.

(b) *Prevalence of Enteric fever in Colombo compared with some other Eastern towns.*—One of the features of the Vital Statistics of Colombo which cannot fail to arrest attention, is the apparently much greater prevalence of Enteric fever here than in most of the other great seaport towns in the East. This is a matter therefore which calls for some explanation, since otherwise Colombo will achieve, if indeed it has not already done so, the unenviable, and as a matter of fact unmerited reputation of being one of the worst Enteric infected ports in the East.

While it is not intended to in any way minimise the really great prevalence of this disease and the gravity of the problem with which we have to contend here, it is only fair that what appears on investigation to be the true statement of the case as between Colombo and other Eastern towns should be recorded.

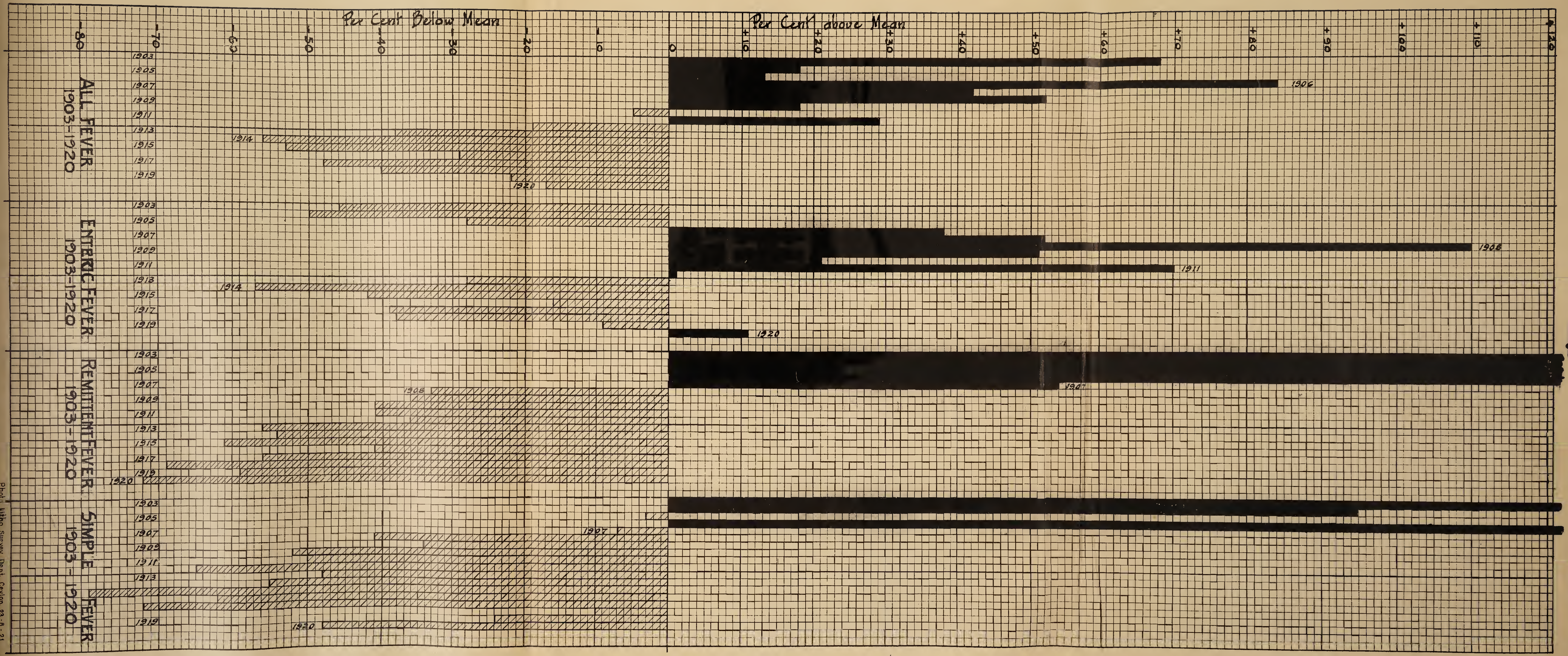


Photo Litho Survey Dept. Ceylon, 23-6-21

The following statement shows the relative incidence of Enteric fever mortality *as recorded* in Colombo and in four other large seaport towns in the East.

	Enteric death-rate in 1919 per 1,000 of population.
Colombo	0·99
Town A	0·44
,, B	0·14
,, C	0·10
,, D	0·05

From the above it would at first sight appear that Enteric fever was from 2 to 19 times as prevalent in Colombo as in these other towns ; but as is shown below there is very good reason for believing that this statement of the case is far from being just to Colombo.

If one looks back say 20 years it will be found that, except in the case of Europeans, Enteric fever held a relatively unimportant position as a cause of deaths in the Vital Statistics of Colombo. As however both diagnosis and notification were known to be good in the case of Europeans, whereas they were notoriously defective and indeed so far as notification was concerned did not exist amongst the indigenous races, the suspicion naturally arose that the Enteric fever death-rate as recorded did not represent the true state of affairs as regards the indigenous races. As a test of this point the total fever death-rates of the respective races were analysed, wherupon it was found that although the Europeans had it was true a much higher Enteric fever mortality than in the case of other races, they had a much lower mortality from ‘ other fevers ’, including ‘ simple continued fever ’, remittent and intermittent fever. Investigation in the field next disclosed the fact that, except in the case of non-residents who had come in from country districts for treatment, practically none of these so called cases of simple continued, remittent and intermittent fever were malarial in origin, but that they were in fact nothing more nor less than cases of Typhoid or paratyphoid.

Upon this fact being made known, while at the same time notification not only of Enteric which had hitherto been in abeyance, but also of simple continued fever which was now for the first time made a notifiable disease, was enforced, a remarkable change began at once to come over the statistics in that while the number of deaths ascribed to these unspecific “ other fevers ” rapidly decreased, the number ascribed to Enteric fever markedly increased, as the result solely of improved diagnosis.

This was however not the only result, since the rapidly improving notification now made it possible to direct preventive measures against the actual foci of infection, with the result that the total fever mortality (including Enteric fever) began to decline in the striking manner depicted on diagram ......

This improvement was maintained until the outbreak of the war in 1914, since when however owing to conditions beyond our control, as previously described, Enteric fever has increased ; but notwithstanding this set back Colombo still has a far lower ‘ total fever ’ mortality than any of the other large seaport towns, which as is explained below is believed to be tantamount to saying that it has far less Enteric fever than these other towns.

Turning now to the statistics of the four Indian towns referred to, if their ‘ total fever ’ mortality is analysed the comparison instead of being unfavourable is very favourable to Colombo, as the following statement shows :—

	Enteric death rate per 1,000 in 1919.	Malarial death-rate per 1,000 in 1919.	‘Other fevers’ death-rate per 1,000 (exclusive of Enteric and Malaria) in 1919.	Total fevers rate per 1,000
COLOMBO	0·99	0·18	0·23	1·40
TOWN A	0·44	1·30	2·70	4·44
,, B	0·14	0·26	5·28	5·68
,, C	0·10	1·20	5·00	6·30
,, D	0·05	0·89	11·83	12·77

It will be seen from the foregoing statement that not only has Colombo much the lowest mortality from ‘ other fevers ’ but also the lowest ‘ total fever ’ mortality. The higher the Enteric fever death-rate is, the lower is the total fever mortality, and *vice versa*, the explanation of this no doubt being that good diagnosis and good notification while facilitating preventive measures, at the same time also ensure a more complete record of the Enteric which is present. In the light therefore of the Colombo experience as described above it would appear to be not unreasonable to deduce from their returns that these other towns have in reality a far higher Enteric fever incidence than their returns appear to indicate, or than exists in Colombo.

Such a conclusion is indeed supported by the remarks of some of the Health Officers of these towns, who have clearly stated their opinion that the Enteric fever incidence as recorded in their towns is far from presenting a complete statement of the facts. In this connection also the remarks by the late Sir Pardey Lukis, Director General of the Indian Medical Service, are significant. He says “ at one time it (*i. e* , Enteric fever) was thought to affect only Europeans, but thanks to the labours of Major Rogers, I.M.S., we now know that it is exceedingly common among natives in India, except in Eastern Bengal and Assam, where there is a heavy and continuous rainfall ”, and again “ Enteric fever, must be regarded as one of the most formidable diseases with which we have to contend in India ”.

The late Professor Osler of Oxford maintained that “ Enteric fever is every where an index of the sanitary intelligence of a community ” a dictum which it is obviously less difficult to agree with here if one accepts the conclusions recorded above in regard to the relative prevalence of the disease here and in Indian towns.

(c) *Enteric preventive measures.*—Every case of Enteric fever which is reported is investigated by this department, and in cases where home isolation is considered to be so defective as to be a source of danger to others, the patient is removed to the Enteric Hospital.

In all cases where home isolation is permitted, a special bucket is provided for the excreta of the patient, which is disinfected under the supervision of the Sub-Inspector in charge of the case, who visits daily or as often as the circumstances of the case require. Disinfectants are supplied free of charge and the relatives in attendance upon the patient are instructed in their use and in other preventive measures in accordance with the Departmental regulations on the subject. In the cases where the general sanitary condition of the infected premises is not satisfactory, the Public Health Department cleansing gang is at once sent in to clean up the compound, disinfect the latrines, &c. The source of the water supply and the milk supply is enquired into and recorded. Enquiries are also made as to whether there are or previously have been any other cases of ill-ness in the house or in the immediate neighbourhood. The following general measures are also adopted. The Sanitary Inspectors have instructions to pay special attention to the state of all dry-earth latrines as these are regarded as being a fruitful source of infection. Milk sampling is carried on all over the town with a view of detecting and checking adulteration which as is recorded in Section 74, has been on the increase during the last few years, and was particularly prevalent in 1920.

A great barrier to the carrying out of preventive work is the existence of Enteric "carriers" which although undoubtedly numerous can seldom be detected, and can only be verified by a bacteriological examination the carrying out of which is frequently attended with great difficulties and may be altogether impossible as the consent of the individual concerned is necessary.

Another barrier to the carrying out of preventive measures is raised by the neglect on the part of some of those who are legally responsible for the notification of cases. That such neglect does exist and to a very considerable extent, is practically proved as previously stated by the high case mortality amongst the cases which are notified. It is probable that this form of neglect occurs most commonly amongst Vedaralas, and includes a considerable proportion of mild, non-fatal but none the less highly infectious cases.

13. **Plague.** (a)—*Recrudesence and change in type of the disease.* After an interval of fully two years during which the number of Plague cases remained so low as to be almost negligible, the disease broke out again with unusual severity during the last quarter of 1919, this recrudesence being associated, as was explained in the report for that year, with the failure of the Indian rice supplies, and the consequent importation of large quantities of other kinds of grain which, instead of going into the Government Granaries as in the case of rice, was stored in the rat-infested godowns in the town.

During the first few weeks of 1920 the increased incidence of the disease was maintained, but with the onset of the hot weather, it as usual declined, although there was a slight but ominous increase of both rat and human Plague during the off-season in June and July which, taken in conjunction with the flea index and an apparent increase in the rat population enabled Dr. Hirst to predict a recrudesence of the disease which occurred towards the end of the year.

The total number of cases reported during the year was 239, as against 89 in 1919, 4 of the cases in 1920 having been admitted to Hospital from districts outside the town. 223 or 94·9 per cent of the cases proved fatal. 93 cases were of the purely septicæmic type, all of which as usual died, while 142 or 59 per cent were bubonic, of which 130 or 91·5 per cent died.

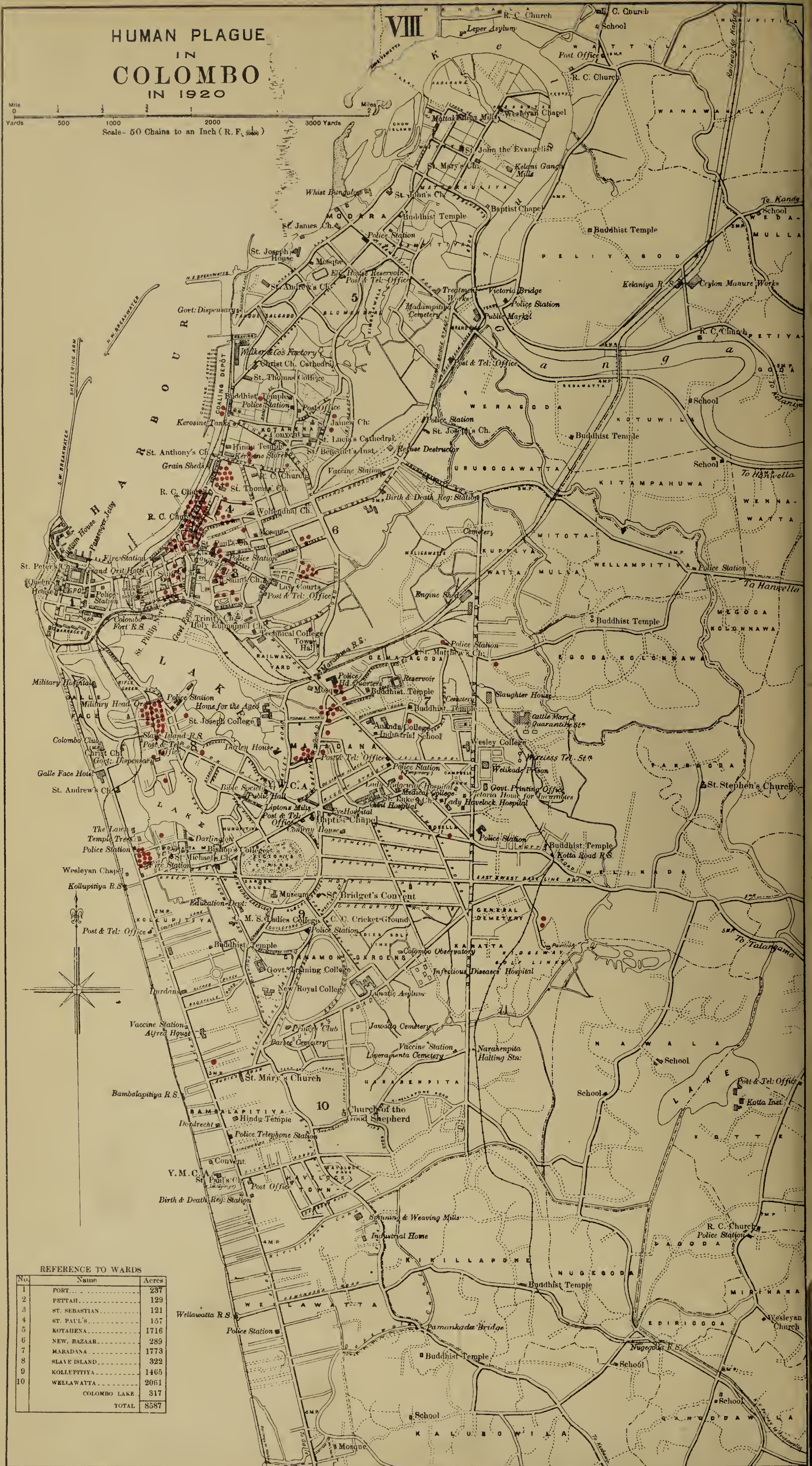
This is the first year since Plague appeared in Colombo that the bubonic cases have exceeded the septicæmic in number, in which connection Dr. Hirst reports there is evidence that the type of rat Plague also is becoming more bubonic and proportionately less septicæmic in character. This observation, if confirmed by exact methods of investigation which Dr. Hirst proposes to undertake, has an important bearing upon the methods employed in the diagnosis of rat Plague, since as Dr. Hirst says the microscopic examination will become less reliable as an index to rat plague, and a factor of correction deduced from the naked eye appearances will need to be introduced. It is also important in connection with the spread of the disease, for as Dr. Hirst has elsewhere pointed out the septicæmic Plague of Colombo is entirely different both bacteriologically and clinically from the bubonic Plague of Bombay. He has estimated that the number of bacilli in the blood of a septicæmic case may reach 100 million per c. c., whereas in the blood of bubonic cases the Indian experts have estimated that only 5 bacilli per cubic centimeter would be an ordinary figure. In these proportions therefore the risk of transmitting Plague from a septicæmic human case by means of a flea would be roughly 20 million times as great as in an ordinary bubonic case.

The significance of these facts, and of the fact that Colombo has hitherto been the only place in the world in which, so far as published records show, the far more dangerous septicæmic type has predominated over the bubonic type in point of numbers, does not appear to be generally realised even in Colombo.

(b) *Plague in relation to age and sex.*—(See statements 24 and 25).—In Colombo, the victims of Plague have for the most part been well nourished young adults, males being attacked far more frequently than females in proportion to their respective populations. Very young children and old people have been comparatively seldom attacked. Thus in 1920, as statement 24 annexed shows, much the highest rate of incidence occurred between the ages of 15 and 20 years, while comparatively few were attacked below 10 or above 50 years of age. The rate of incidence amongst males was 1·36 per 1,000 of the male population, whereas the rate amongst females was only 0·33 per 1,000 of their population.

The experience in India, as recorded by Major Norman White, agrees with Ceylon as regards the age distribution of the cases, but differs markedly as regards the sex distribution in that the rate of incidence in India is slightly higher amongst females than amongst males. Major White suggests that infants and young children in India appear to enjoy a certain degree of immunity; but it seems probable that in Colombo the differences in incidence as regards both age and sex, may be better explained by differences in the degree of exposure to infection.

Thus the high incidence amongst young adult males as compared with females, very young children and old people may be explained by the differences which exist in the habits of these classes, especially at night when fleas are most active and most infections probably occur. In Colombo, rat holes are generally most numerous in the cooking place, which in tenement houses, where most of the Plague cases occur, is situated, as a rule, in an enclosed or partially enclosed verandah adjoining the door, and it is the usual custom here for the young adult males to sleep in



HUMAN PLAGUE
IN
COLOMBO
IN 1920

Scale- 50 Chains to an Inch (R. F. $\frac{1}{39600}$)

REFERENCE TO WARDS

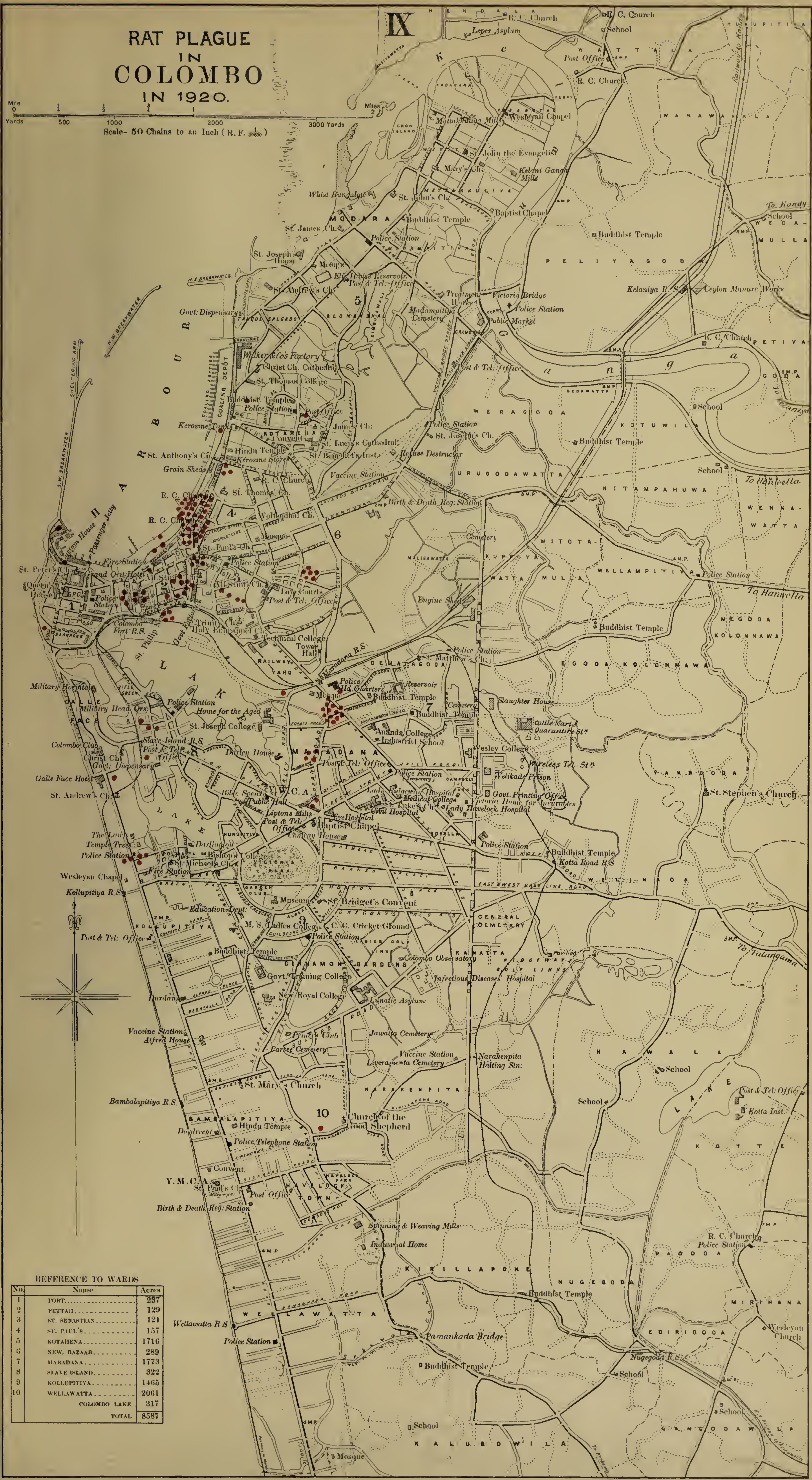
No.	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW. BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587

Photo.Litho. S.G.O. Colombo 24 8 21

Revised in February 1917

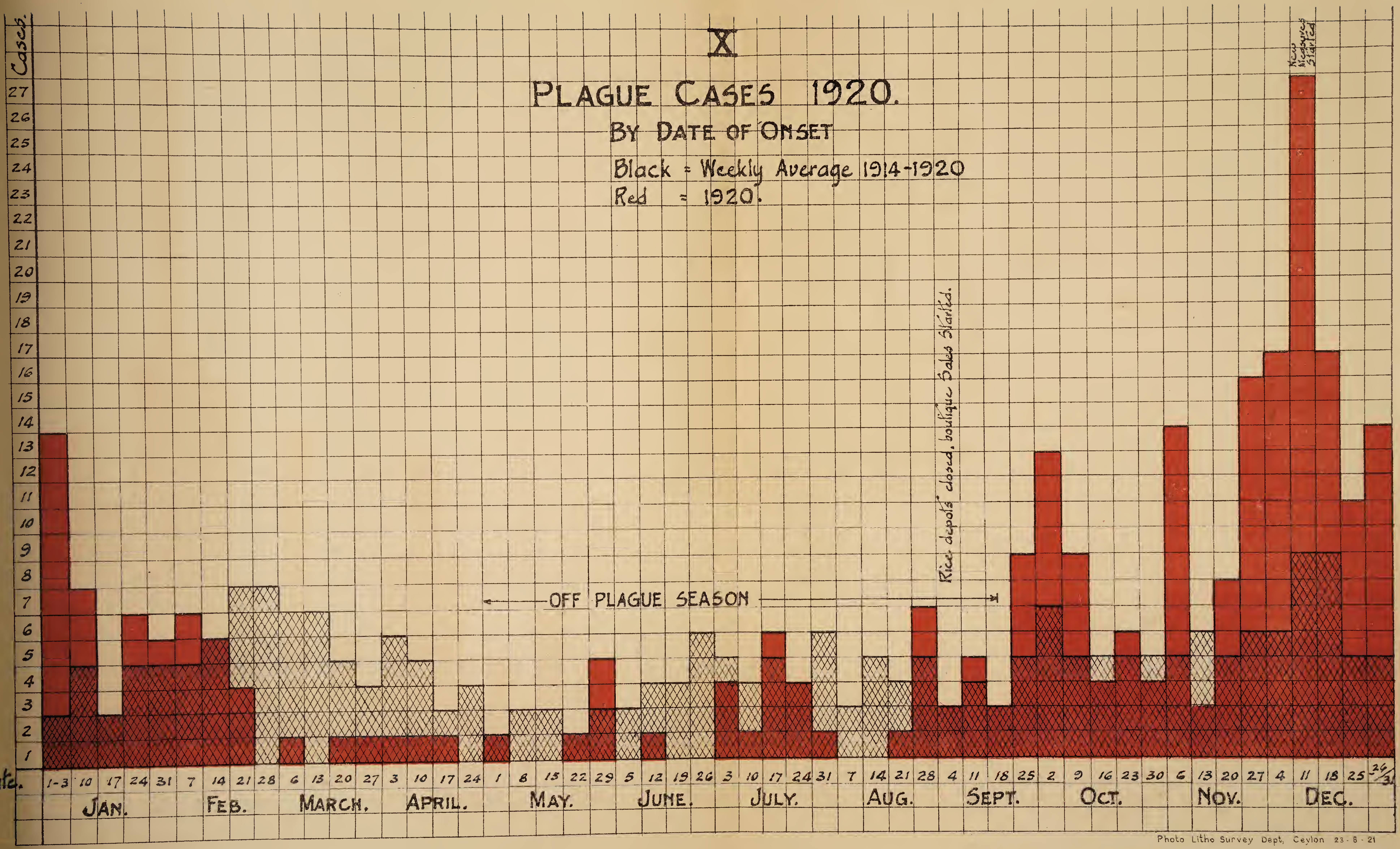
IX

RAT PLAGUE IN COLOMBO IN 1920.



REFERENCE TO WARDS

No.	Name	Acres
1	FORT	237
2	PETTAH	129
3	ST. SEBASTIAN	121
4	ST. PAUL'S	157
5	KOTAHENA	1716
6	NEW. BAZAAR	289
7	MARADANA	1773
8	SLAVE ISLAND	322
9	KOLLUPITIYA	1465
10	WELLAWATTA	2061
	COLOMBO LAKE	317
	TOTAL	8587



X

PLAGUE CASES 1920.

BY DATE OF ONSET

Black = Weekly Average 1914-1920
Red = 1920.

Photo Litho Survey Dept, Ceylon 23-8-21

this small outer room or space whereas the females and children and very old people generally sleep in the more secluded and more spacious inner room, where rat holes are, *comparatively* speaking, seldom found.

In India the inner room appears to be used very commonly for storing sacks of grain (*vide* page 694 Reports on Plague in India), which naturally attract rats to these inner rooms, whereas in Colombo this practice does not obtain. It probably obtains however in the country districts of Ceylon where stocks of grain have to be kept for domestic and agricultural purposes.

It seems probable therefore that the differences in the incidence of Plague as regards both age and sex are mainly if not entirely due in Colombo to differences in the degree of exposure to infection by the bites of rat fleas.

One point which clearly emerges from this is the necessity which exists for rendering at least the floors and walls of dwellings proof against the burrowing of rats, since a person sleeping on the floor where rat holes open out at the floor level is obviously exposed to great risk of infection in the event of Plague breaking out amongst the rats.

In this connection it is of interest to record what one has repeatedly observed, *viz* :—That persons sleeping upon beds raised well above the floor level comparatively seldom acquire Plague, even when living in the heart of a Plague infected area. A striking illustration of this is to be found in the case of the Afghans in Colombo, who always sleep upon extraordinarily high beds, and who are scarcely ever attacked by Plague, although they live for the most part in one of the worst Plague infected areas of Slave Island.

(c) *Plague in relation to the grain trade.*—The association between Plague and the grain trade goes back 1378 years to the reign of Justinian, when in the year 543 A. D. the first great "bubo-plague" was carried in the corn ships from Egypt to Byzantium, whence it spread over and decimated the whole of Europe, thus causing, as Creighton has said, such a vast depopulation and solitude that it materially assisted in bringing to an end the ancient civilisation which preceded the dark middle age of European history.

Coming to recent times, the history of Plague as recorded in India and elsewhere teems with references to this same association between Plague and grain, which has been given expression to by Major Norman White, I.M.S., the Sanitary Commissioner with the Government of India, in the statement that "the grain trade in Plague-infected India, is in a very special sense a dangerous trade".

That this remark applies equally well to Ceylon in general and to Colombo in particular will be realised by a reference to the previous reports of the Public Health Department, and what is recorded hereafter in this Report.

Although Plague first broke out in epidemic form in India at Bombay in August, 1896, no case of either rat or human Plague was reported in Ceylon until January, 1914, *i.e.*, 18 years later. The history of its introduction into Ceylon is as follows :—

Nagapatam a seaport on the south east coast of India, about 70 miles north of Ceylon, has for many years carried on a brisk trade with Colombo, the chief export being grain. This town remained entirely free from Plague until November, 1913, during which month the first case of the disease occurred there and by December it had assumed epidemic proportions. As the trade in grain continued, and the passage to Colombo occupies only a matter of hours, the risk of the infection being conveyed here is obvious. At that time unfortunately Dr. Hirst the Municipal Bacteriologist, who had been carrying on the examination of rats for Plague since 1912 without finding a single infected one, was absent at the Sanitary Conference in India so that these examinations were for the time being suspended, and thus the exact date when the disease first appeared amongst the rats in Colombo is not definitely known. It is however known that the first cases of human plague occurred in Januasy, 1914, at Sea Street which was then the chief centre of the Indian grain trade, so that if allowance is made for the usual interval between the appearance of rat plague and the outbreak of human plague, the date of importation of plague into Ceylon can be confidently fixed as December, 1913, *i.c.*, at the very time the disease was prevailing in epidemic form in Nagapatam. Taking all the circumstances into consideration there can thus be no doubt that the infection was derived from Nagapatam, and was conveyed here in December, 1913, in the grain ships.

Plague having thus obtained a footing amongst the rats in the chief centre of the wholesale grain trade in Colombo, rapidly spread along the main lines of communication, to the bazaars at Slave Island, Maradana and Nagalagam, where a considerable retail trade in grain is carried on in the boutiques, the supplies for which were at that time derived from the wholesale grain stores in the infected Sea Street area. The disease also appeared early amongst the rats at the Railway goods sheds where grain for upcountry is received.

By the end of April, 1917, *i.e.*, in 3 years, the incidence of the disease had been reduced to such an extent as to be almost negligible as a cause of deaths, and so remained for 2½ years, *i.e.*, until September, 1919, when it suddenly broke out again with unusual severity.

The facts in regard to this recrudescence in 1919 are of especial interest in that they afford a striking illustration of the dangerous association between plague and grain trade as the following shows.

When the supplies of Indian rice suddenly failed in May, 1919, and the existing stocks became dangerously low, the grain merchants began in July to import large quantities of other kinds of grain by way of substitutes for the rice. The abnormally large quantities of these other grains thus imported is shown in the following statement, the details of which were kindly furnished by the Principal Collector of Customs.

IMPORTS OF GRAIN OTHER THAN RICE.

	1916.	1917.	1918.	1919.	Average prior to rice troubles	1919.	1920.	1921
January	41,377	19,291	34,666	20,096	**28,858**	—	153,315	26,740
February	25,238	30,910	25,828	21,174	**25,788**	—	182,040	24,501
March	18,360	25,497	20,109	23,853	**21,955**	—	32,451	21,977
April	31,695	32,978	20.041	31.949	**29,165**	—	22,474	30,692
May	22,815	26,311	31,349	15,322	**23,949**	—	22,705	—
June	29,349	26,370	8,722	31,828	**24,067**	—	51,118	—
July	27,654	21,945	41,174	—	**30,258**	61,053	71,374	—
August	20,605	21.349	24,253	—	**22,069**	146,903	58,836	—
September	49,291	28,339	19,782	—	**32,471**	57,350	72,363	—
October	33,345	55,613	17,914	—	**35,624**	136,514	80,721	—
November	45,548	22,831	12,741	—	**27,040**	43,216	82,592	—
December	30,514	9,009	16,954	—	**18,826**	92,478	48,831	—
TOTAL	375,791	320,438	273.533	144,222	—	537,514	878,820	103,910
Monthiy Average.	**31,316**	**26,703**	**22,794**	**24,037**	26000	**89,586**	**73,235**	**25,977**

"The special danger in so far as Plague was concerned, in connection with this great increase in the importation of these other grains lay in the fact that whereas the whole of the imported rice supplies went from the ships into the Government Granaries which were specially designed to prevent rat infestation, the imports of all grain other than rice went direct into the rat infested stores and boutiques throughout the town. There was thus accumulated in the busiest and most populous parts of the town a freely accessible and practically unlimited supply of ideal rat food, which as is well known, invariably leads to an increase of the rat population which has been found to vary in accordance with the amount of food available. This increase of the rat population, involving as it necessarily did an increase in the proportion of young and therefore non-immune rats, was all that was required for the occurrence of an outbreak of rat Plague which, according to the records of cases found, began in September, 1919, and was in due course followed by an unusually severe outbreak of human Plague in the succeeding months."

This outbreak continued until about the middle of February, 1920, when it declined to below normal, and except for a slight increase in July remained low until September when it once more assumed epidemic proportions, reaching a maximum during the week ended 11th December, with the record large number of 27 cases in one week.

"The facts in regard to this further outbreak at the end of 1920 are also of special interest in that here again we have another but apparently somewhat different example of the association between Plague and grain, the explanation of which appears to be as follows :—

" When Food Control was established in May, 1919, the whole of the retail trade in rice which had up till then been carried on in some 967 boutiques distributed all over the town, was taken over by the Food Control Department, and was thereafter concentrated in and strictly confined to a series of some 64 depôts which were conducted by the staff of the Municipal Council. This particular source of rat food was thus very much curtailed, since not only were the depôts very few in number compared with the boutiques but they were for the most part located in isolated sheds and bungalows, the stocks in which were completely changed each day, and as nothing but rice was dealt with in these depôts, rats had little opportunity of obtaining shelter or multiplying there, and were as a matter of fact seldom seen. The establishment of this rice depôt system, although by no means an unmixed blessing as the experience in connection with Enteric and Measles shows, was therefore very unfavourable to Plague, and but for the importation of other and uncontrolled kinds of grain as stated above, there can be little doubt that instead of an increase there would have been a decrease of Plague in 1919. As it was, the incidence of the disease remained low from February till September when however it again broke out with unprecedented severity, the explanation of which is believed to be as follows :—

" The supplies of Indian rice had increased by the middle of 1920 to such an extent that it was decided to abolish the depôt system, and this was done on 1st September, 1920, whereupon the whole of the retail trade in rice at once passed back into the hands of the boutique keepers, with the result that these small shops, of which there were 967 in the town, laid in stocks of rice in addition to the other food supplies in which they deal. As experience in anti-plague work has shown, these rice boutiques are an unfailing source of attraction for rats and are invariably heavily infested, so that this sudden accession of rice greatly enhanced their rat breeding capabilities and thereby greatly increased the danger of plague, which as stated above broke out with unprecedented severity during the succeeding months." ~~(See Diagram X).~~

Plague in relation to trade in grain sacks.—Another and rather remarkable instance of the association between Plague and the grain trade has recently been elucidated in connection with the persistence of Plague in Prince street, Pettah. Upon classifying by streets all the cases of Plague which occurred during the 7 years 1914—1920, it was found that Prince street alone out of 166 streets which have been infected but which are not within the area served by the old untrapped, underground rainwater drains, has never been freed of Plague for so long as a year at a time. Upon investigating this matter, suspicion was aroused by the fact that a considerable trade in sorting and mending old grain sacks was carried on in this street. A census of all premises in the town where this trade is carried on was accordingly held, with the striking result that out of a total of 24 premises in which this trade either was then or until quite recently had been used for this purpose, no fewer than 21 or 87·5 per cent were situated either in Prince street itself or in one of the immediately adjoining streets, 15 of them being in Prince street itself.

When it is considered that these old grain bags must frequently contain fleas dropped by rats which have visited the grain, and that a certain proportion of these fleas are likely to be infected so long as rat Plague exists, there can be little doubt that these old grain bags are a source of danger, and that the existence of such a large number of these stores in Prince street is sufficient to account for the persistence of Plague there. Upon looking up the literature on Plague it has been found that the Indian Plague Commissioners have also drawn attention to the possible danger associated with this trade in old grain bags.

When this source of danger was thus discovered, preventive measures were at once adopted, the stores being emptied and the gunny bags exposed to the sun, while the floors were pesterined and all rat holes were fumigated and filled up. As however there is a constant stream of these bags coming in and going out, reinfection is liable to occur at any time, and the preventive measures will therefore have to be repeated from time to time.

The experience in Colombo, as related above, fully bears out the statement that here, as in India, the grain trade is in a very special sense a dangerous trade, and measures must accordingly be adopted, in the interests of public health, to limit that danger as far as possible by insisting upon all grain stores and grain shops being rendered as far as is practicable 'rat proof' or at least 'rat free'. It was for this reason that the Chalmers Granaries and the Manning Market were built by Government for the accommodation of the wholesale rice trade, and for the same reason an effort is now being made to improve the conditions under which the retail trade in grain is carried on in stores and boutiques throughout the town. The conditions required are specified in the grain regulations which were published in *Government Gazette No. 6,832 of November 3, 1916, and it is an attempt to give effect to these regulations that is now being undertaken. The task is however a difficult one owing chiefly to the great number of petty traders engaged in this trade, and their reluctance to embark upon what no doubt appears to them to be unproductive expenditure. The danger to themselves and the public, and the enormous loss which they themselves undoubtedly suffer as the result of the ravages caused by rats, are arguments which have little effect upon them when the remedy involves the immediate expenditure of hard cash.

Neither the Chalmers Granaries nor the Manning Market provide accommodation for grain other than rice, and as the experience in 1919 shows these other forms of grain are just as dangerous from the point of view of Plague, as is rice. It is therefore very desirable as a public health meausre that proper granaries should be erected for the accommodation of the wholesale trade in these other forms of grain, but as it seems improbable that Government will undertake this further expenditure, help must be sought in some other direction.

(d) *Plague in relation to climate.*—The experience of 20 years of Plague in India as recorded by Major Norman White has been that a mean atmospheric humidity above the normal when accompanied by a mean temperature below the normal is favourable to outbreaks of Plague in epidemic form.

As the comparatively brief experience of Plague in Colombo indicated that a similar correlation existed here, I submitted the Plague statistics for the 7 years 1914—1920 to Mr. Bamford, the Superintendent of the Observatory, with a view of obtaining his opinion thereon as an expert mathematician and meteorological observer. Mr. Bamford with his usual courtesy undertook this investigation, with the very interesting results recorded below :—

The interest and value attached to Mr. Bamford's observations and deductions are enhanced by the fact that he is not a medical man, has had nothing to do with preventive measures, and at his own request was not supplied with relative information beyond a record of the Plague cases and a general statement that the recrudesence of Plague in 1919 had been attributed to the great increase in the importation of grain into the rat infested stores in the town. He therefore approached the subject with a mind free from any bias which might conceivably be unconsciously created by an intimate knowledge of the epidemiological facts and of the administrative measures which had been adopted at various times during the period under consideration.

M
No.................., 1921.

From the SUPERINTENDENT OF OBSERVATORY, COLOMBO, to the MEDICAL OFFICER OF HEALTH, COLOMBO.

Colombo, 25th April, 1921.

SIR,

I HAVE the honour to submit the attached report on the plague figures that you referred to me in connection with meteorological conditions.

I am, &c.,
A. J. BAMFORD,
Superintendent Observatory.
for W. C. S. INGLES,
Surveyor General.

MR. BAMFORD'S REPORT ON PLAGUE AND ITS CORRELATION WITH METEOROLOGICAL FACTORS.

THE PROBLEM.—The problem as presented to me was roughly this :—Given certain statistics of plague to ascertain if there was appreciable direct correlation between them and the meteorological conditions and in particular whether a sufficiently rigid connection could be established to base a definite plague warning on those observations or to be able to say in the case of possible future plague outbreaks that they did, or did not occur under conducive meteorological conditions.

Since there are always a variety of causes at work, such discrimination might enable an outbreak to be attributed at once as due to some fresh cause and conversely might assist in evaluating different preventive measures. Since a fall-off in the number of plague cases may be due to natural or artificial reasons, to get such a fall when one can state definitely that the meterological conditions are favourable to the spread of plague would be a strong endorsement of the preventive measures in vogue.

---

* As amended by Government Gazette No. 7,164 of March 24, 1921.

METHOD.—It is a straightforward matter to make out curves of plague cases, temperature, humidity, &c., and obtain correlation cœfficients for them and it was on account of the dangerous ease with which curves can be "made to fit" that I adopted the following method to try to get confirmation of the physical as well as the mathematical reality of the figures.

Since the proportional effect of extraneous causes affects average figures less than those for any particular month the first thing was to compare the monthly averages for the last 7 years with those of temperature, humidity, &c., for the same period. *Figure 1* brings out the main point that plague tends to increase in times of low (dry bulb) temperature and of high humidity, but since humidity is itself a function of the difference between the dry and wet bulb temperatures, if the two causes above are at all equal in value the two dry bulb effects will cancel and the main factor will be the remaining wet bulb. After a little manipulation I got cœfficients for the relation of the wet bulb temperature and humidity that were roughly as 2:1 and in opposite direction. (—13·7 & + 6·6 were the actual figures) with wet bulb expressed in °F and humidity in % of saturation.

With these units a convenient formula was—(Humidity—70)—2 (Wet bulb—70), giving for the average the *curve 2* which will be found to be reasonably parallel to the average plague curve in *Figure 1*. The next question is whether this parallelism is real or accidental, and the obvious step is to use the formula derived from the averages of the seven years for each of the individual years and to see how well the parallelism is maintained. This is done in *graph 3* where the plague cases of each week are plotted and a smooth curve is drawn by combining these points in groups of three. Alongside of this are plotted the results of the formula above applied to monthly means and set forward three weeks from the middle of the month in question.

DEDUCTIONS.—It must be remembered that I have had nothing to do with anti-plague administration and the following deductions are made purely on the basis of the curves and hence form a test of the reality of the connections between the theoretical formula above and experienced facts :—

(1) There is a rough parallelism from the middle of 1915 to early in 1917 and again from this date to the middle of 1919 though in the latter period the plague figures are relatively lower suggesting that *some benign non-climatic factor came into effect at the beginning of 1917 and remained in action.*

(2) From the middle of 1919 there is a distinct rise in the number of cases, there are still slight signs of parallelism between the curves but the main suggestion is that *a new malign factor came into action in the middle of 1919.*

In this case unlike the former one I can offer a suggestion as to what that factor is, *viz :* the introduction of grain *via* the Pettah not *via* the main granaries.

I know such grain has come but I do not know when it started. On purely correlation grounds I suggest July 1919 and should be glad of information as to whether this is correct.* On theoretical grounds I suggest that the difference between the red and black curves will show a parallelism to the amount of such grain imports. If this is confirmed by the figures it would afford a strong proof of the legitimacy of the theory above.

(3) *In February and March of this year there has been a sharp decrease in plague despite suitable meteorological conditions for its spreading.* The suggestion is that *some new preventive measure has been in action*, e.g., has the Pettah grain import been reduced ?

(4) Referring back to the early part of the curve the initial lack of parallelism is not surprising, as an initial state is not a normal one. There is faint parallelism in the latter part of 1914 and a noticeable feature is the way that nature assisted the medical authorities, in March, 1915 a fact possibly connected with the subsequent lag in the plague curve which did not go up till some time after the black one had done so in the middle of 1915.

A. J. B.

NOTES ON MR. BAMFORD'S REPORT.

Mr. Bamford's report confirms the observation that Plague tends to increase in Colombo in times of low (dry bulb) temperature and of high humidity, and he draws attention to certain departures from this rule which have occurred, and the explanation of which must therefore be sought in the existence of non-climatic conditions. Taken in chronological order his deductions are as follows :—

His conclusion that some benign non-climatic factor must have come into operation early in 1917 and was responsible for maintaining a low Plague incidence until the middle of 1919 appears to indicate that the preventive measures then in force were responsible for the improvement.

His observation that the increase of Plague during the latter half of 1919 was not accounted for by the climatic conditions, but was probably associated with the import of grain into the Pettah confirms the opinion previously expressed in Section 18 of the Annual Report for 1919 and in sub-section (*c*) above.

The reduction of Plague during the earlier part of 1920 indicates that the preventive measures again for a time prevailed over the various adverse non-climatic conditions, the period of improvement being however a short one.

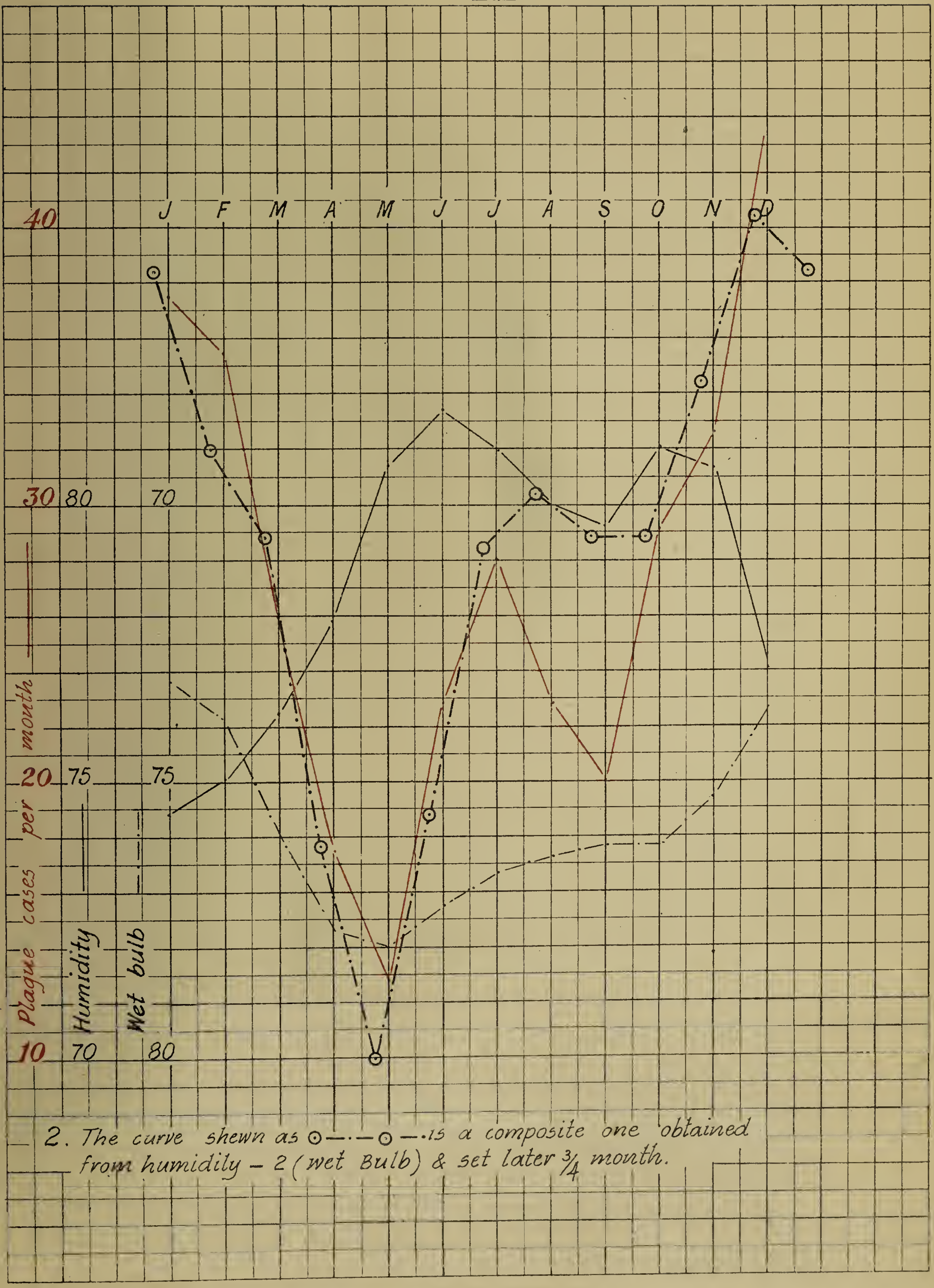
---

* Since writing the above I have received some figures of grain imports other than rice.

These when plotted below curve three suggest the possibility of a connection in the latter half of 1919 but if this is real there must have been some other preventive measure in February, 1920, and a further malign cause at the end of 1920.

A. J. B.

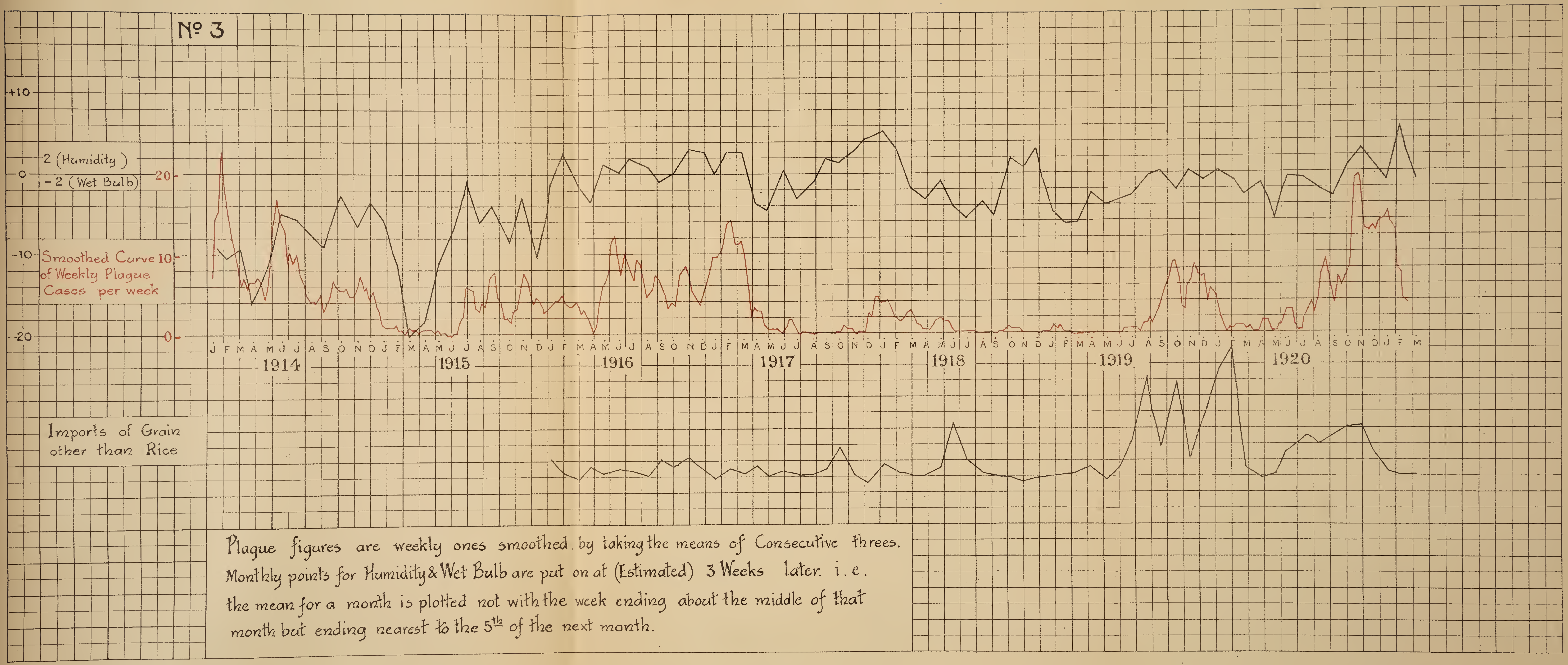
XI



2. The curve shewn as ⊙—·—⊙—· is a composite one obtained from humidity – 2 (wet Bulb) & set later 3/4 month.

Photo Litho. Survey Dept; Ceylon 23.8.21

No 3



Plague figures are weekly ones smoothed by taking the means of Consecutive threes. Monthly points for Humidity & Wet Bulb are put on at (Estimated) 3 Weeks later. i. e. the mean for a month is plotted not with the week ending about the middle of that month but ending nearest to the 5th of the next month.

Photo, Litho, Survey Dept; Ceylon. 23.8.21

The increase of Plague during the latter part of 1920 has already been explained in sub-section (*c*) above as resulting in all probability from the flooding of the boutiques throughout the town with rice which occurred on the abolition of the rice depôt system on 1st September.

The sharp decrease of Plague which occurred in February and March of the present year (1921) despite meteorological conditions favourable to the spread of the disease, may be to some extent explained by the reduction in the imports of grain other than rice which occurred during the first three months of the year, but these imports although much below the abnormally high imports of the previous 18 months were still equal to the average, and it is therefore thought that the very marked reduction in Plague can fairly be claimed as in a large measure at least, the result of the new preventive measures which were initiated on 6th December, described in sub-section (*h*) below. Observation in the field certainly tends to confirm this opinion.

“(e) *Plague in relation to season.*—From what has been said in regard to Plague in relation to climate, it follows that Colombo having an exceptionally equable temperature throughout the year, the incidence of Plague here does not show such marked seasonal variations as occur in most other Plague infected countries. On the basis of the statistics for the seven years 1914–1920, the normal "Plague season" in Colombo may be said to start with the North East Monsoon in September, reach its maximum in December, and end with the onset of the hot weather towards the end of April, while the "off plague season" lasts conversely from April to October, the minimum being reached in May, with however a slight but distinct tendency towards an increase in June-July, following the South West Monsoon.”

Needless to say, with such a short total period as seven years upon which to base the "normal", marked variations from the normal are liable to occur.

(f) *Plague in relation to the old underground drains.*—A classification by streets of all the Plague cases which have occurred during the seven years since the disease appeared in Colombo shows that 172 different streets have been infected at one time or another during that period, many of them having been repeatedly infected after intervals ranging from a few weeks up to four years. Assuming, as may very safely be done, that if the disease appears in any street which has had no case for a year or more, the infection must have been reintroduced, and has not merely lain dormant amongst the rats there, it has been found that excluding nine streets recently infected for the first time, all the infected streets in Colombo *except seven* have been freed of Plague for a period of not less than one complete year.

The seven streets which have never been freed of Plague for so long as a year at a time are (1) Sea Street (2) Sea Beach Road (3) Chekku Street (4) Kochicadde (5) Wolfendahl (6) Dam Street and (7) Prince Street, Pettah. In seeking for an explanation of the persistence of Plague in these 7 streets, there is, so far as one can ascertain, one condition, and only one, which is common to them all except Prince Street. This condition is the existence of the old underground, untrapped rainwater drains, which discharge into the Harbour, and to the existence of which the persistence of Plague in this area has repeatedly been attributed in the Public Health Department Reports during the last few years. Many of these drains are known to have untrapped connections with the houses, and in some instances rat holes in the houses have been proved to lead down to these drains.

These drains are so old that even their number and the course of some of them is not known; but the writer has made a journey up one of the largest of them from its exit at the Harbour front to Wolfendahl, passing under Sea Street and Chekku Street, and can vouch for it that no more ideal thoroughfare and refuge for rats could well be conceived. So extensive is this system and so numerous are the openings into it, that it is quite impossible to get at and destroy the rats, even with the Clayton fumigators. There would therefore appear to be a sufficient explanation of the persistence of Plague in this area in the existence of these old drains, for a survey of which the Council recently sanctioned an expenditure of Rs. 3,000 as a preliminary to undertaking their reconstruction or abolition.

As stated above Prince Street is peculiar in that there are, so far as is known, no old underground drains under it, and some other explanation had therefore to be sought, for the persistence of Plague there. An investigation was accordingly made with the results recorded in in sub-section (*c*) above.

(g) *Rat Plague.*—106,833 rats were trapped, and 25 were found dead by the rat destruction Department under the Veterinary Surgeon. 20,363 rats, including 2,828 killed by the Clayton machines, were examined at the Bacteriological Laboratory with the result that 136 or 0·66 per cent were found to be infected, of which 79, *i.e.*, 58 per cent were killed by the Clayton fumigators, the others being trapped. The corresponding figures for 1919 were 21,739 examined, with 66 or 0·29 per cent infected. 78 mummified and 110 recently dead rats, which had apparently died of Plague, were found for the most part in or in close proximity to houses where cases of human Plague had occurred.

(h) *Anti-plague measures.*—When Plague assumed a more than usually threatening aspect towards the end of the year, it was decided to adopt more drastic measures than hitherto, even at the expense of all other branches of the outdoor work of the Department, and as these measures have proved very effective a brief account of them is here given.

The whole of the inspectoral staff, including Inspectors, Sub-Inspectors, and Overseers, and all the coolies of the Cleansing and Mosquito gangs, together with masons, hired coolies and Clayton machines, were concentrated upon one area. Taking the infected quarter as a centre, the staff was divided into as many gangs as there were Clayton machines available—generally about seven, and these gangs were then distributed in a wide circle around and at some considerable distance away from the infected quarter. Each gang then proceeded as follows, taking each house or tenement in order as it came.

With the willing assistance of the occupants, who were carefully instructed in what we were doing, and the reason therefor, the whole of the contents of every room were turned out into the yard or street, where they were exposed to the sun. Beds, tables, chairs, couches, almirahs, cooking utensils, boxes, clothes, &c., all were turned out, nothing whatsoever being left in the house. These household goods were then inspected, and all useless articles, of which there was an astonishing collection in most houses, were separated out and sent off in specially engaged carts and lorries to the destructor. What was left was then washed and left in the sun until the work in the house was completed.

While the above was going on other men were engaged in pesterining all the floors of the rooms with heavy oil, so as to trap and kill any fleas there. Other men were engaged in removing rows of tiles so as to expose the tops of all the house walls, a search being made for rat holes, rat nests and dead rats, all of which are frequently found in such situations. Any rat holes found on the tops of the walls were at once filled up with cement by the masons. The Clayton machine was then set to pump sulphur fumes into the rat holes and drains on the ground level, while a watch was at the same time kept for escaping rats. All rats killed or found dead were despatched for examination to the Bacteriological Laboratory.

On completion of the above work, all rat holes were filled up by the masons, the tiles were replaced, and the occupants returned their goods to their houses, while the landlord who had in the first instance been served with a limewash notice, carried out the limewashing. The limewashing was, wherever possible, done before the tenants' goods were returned to the house. The opportunity was at the same time taken to improve, as far as possible, any very insanitary dwellings, by removing obstructive additions and partitions, and by getting the landlords to provide additional windows, skylights and smoke vents. Every compound was thoroughly scavenged before leaving.

This work began on 6th December, and during the last three weeks of the year, 941 dwellings were dealt with in this manner, in the course of which 207 cartloads of rubbish were removed from these premises while 1,374½ gallons of liquid fuel were used, *i.e.*, about 1½ gallons per dwelling, or say roughly one gallon per room in tenement houses.

It will readily be understood that such thorough work is slow and laborious, and requires constant supervision ; but the results have been so satisfactory as to fully justify it, in which connection see Mr. Bamford's observation that despite meteorological conditions which were favourable to the spread of Plague in February and March of the current year, there was a sharp decrease of the disease.

So effective has this work proved to be that it is proposed to carry it on a larger scale, for which purpose 6 new Claytons have been ordered and have just arrived, while the Council has sanctioned the appointment of a small special staff for the purpose of carrying out this work during the present off-plague season.

14. **Measles.**—Measles is a disease which, as the experience both here and in other countries shows, tends to recur in epidemic form at intervals of about 2½ to 3 years, and as there was an epidemic in 1916/17 another was not due until the middle of 1920 or early in 1921. As the result however of the abnormal facilities for the spread of infection, which arose in connection with the rice depôts (see Report for 1919) the disease broke out in severe epidemic form in July, 1919, a year or more ahead of its time, from which date it increased throughout 1920, with the result that 1,062 cases were recorded during the year.

15. **Smallpox.**—Although two isolated cases of Smallpox occurred in April and May respectively, the infection of which was traced to Bombay, the town remained free from this disease until the beginning of August, when a Chetty boy brought the infection from Ramnad in South India, and developed it in the house of a Chetty at Sea Street, where he was concealed until a number of other cases infected by him began to appear, whereupon he was surreptitiously removed to the Hindu temple at Wellawatte, where he was again kept in concealment until discovered on 5th September. As the result of this case, coupled with further concealments, an outbreak occurred which continued until the end of the year, by which time 71 cases had occurred, making a total of 73 for the year. The last case in this outbreak was removed to Hospital on 28th January, 1921. Two persons who were responsible for the concealment of the original case in this outbreak were fined Rs. 1000 and Rs. 750 respectively ; but as they were wealthy people it did not have the desired deterrent effect which a term of imprisonment, as provided by the law, would have had.

16. **Vaccination.**—21,497 vaccinations were performed during the year, of which 9,911 were done by the Municipal staff, and 11,586 by the Government Vaccinators who are responsible for primary vaccination in Colombo.

17. **Malaria in Colombo.**—389 cases of Malaria presented themselves for treatment at the Municipal Dispensaries during the year, in each of which an effort was made to ascertain where the infection had been acquired, with the result that 347 or 86·8 per cent of the total cases gave definite addresses outside Colombo, while in 42 cases the patient was stated to have been living in the town at the time the disease was contracted. In 20 of these reputed town cases however no definite address could be given. In 22 cases in which a definite town address was given all except 2 stated that they had been living in or near the Dematagoda area and Skinner's Road, *i.e.*, adjacent to the large Maligawatte swamp. Two cases gave Forbes Road as the place of infection.

The source of infection of the 389 cases acquired outside the town attributed to 85 different places in all parts of the Island, the worst places being as follows :—

MALARIA.

Place of infection.	No. of Cases.
Kurunegala	40
Anuradhapura	35
Chilaw	29
Polgahawela	26
Mahara	16
Mirigama	12
Heneratgoda	10
Puttalam	10
Rambukkana	9
Kegalle	9

For an account of Mosquito Prevention work, see section 20.

PART II. ADMINISTRATION.

18. **General Sanitary Work.**—The details of the work carried out in each ward by the Sanitary Inspectors are given in Statement 30 and include 41,606 domiciliary inspections, the service of 699 notices, the institution of 2,119 prosecutions, with 1,986 convictions, and the imposition of fines amounting to Rs. 15,035/75.

20 insanitary tenements were closed ; 1,651 filthy premises were cleansed by the Public Health Department staff ; 8,932 premises in plague areas were pesterined ; 2,873 were claytonised : 2,291 were partially unroofed and re-roofed in searching for rat nests ; 35,145 rat holes were fumigated during the course of which 2,828 rats were killed ; 2,137 dwellings were disinfected ; 6,066 buildings were limewashed by the owners at the instance of the Department ; 20 dangerously polluted wells and 21 cess-pits were filled up ; 134 loads including 5,154 articles were passed through the steam disinfector during the year.

19. **Latrines and Cesspits.**—*Municipal Latrines and Bathing Places.*—Three new public latrines were opened during the year, situated at Vuistwyke Road, Leyden Bastian Road and Hunupitiya, bringing the total in the town up to 32. The total accommodation thus provided in the town is as follows :—

ACCOMMODATION.

Latrines.	Seats.		Urinals.	Bathing Places.	
	Men.	Women.	Men.	Men.	Women.
32	312	140	236	155	69

The sanitary condition in which these latrines were maintained was very satisfactory, although the accommodation in some of them is very far short of the requirements. More of these very useful public conveniences are certainly required.

CESSPITS.—A recent survey disclosed a total of 531 cesspits in the town, all of which will have to be closed in view of the decision to abandon the night-soil trenching ground at Narahenpitiya, which has been rendered possible by the construction of tipping depôts where the contents of closets not yet connected to the sewers can be discharged into the sewers instead of being carted out to and buried at Narahenpitiya.

20. **Mosquito prevention.**—2,070 premises including 4,770 tenements were inspected in connection with mosquito breeding, with the result that 90,398 potential and 3,907 actual breeding places were found, all of which were abolished or oiled.

79 complaints from householders were received, in connection with which 363 premises were inspected, with the result that 1,530 actual breeding places were found. The services of the small Anti-mosquito gang have been much appreciated by the house-holders, and many communications expressing thanks have been received, in which connection I have much pleasure in recording the excellent work done by Relief Inspector Anthonisz and the men of the Anti-mosquito gang.

Although the sanctioned mosquito prevention staff is one Sub-Inspector, six Overseers and 12 coolies, the Sub-Inspector has seldom had at his command more than two Overseers and four coolies, for the reason that since Plague appeared most of the Anti-mosquito staff have had to be employed on Plague work. The Council has however recently sanctioned the appointment of a small special staff for Plague work which will it is hoped make it possible to relieve the mosquito men to some extent and enable them to give more attention to their mosquito prevention work.

Major James, I.M S., after studying the mosquito problem in Colombo for a year, reported that " in Colombo the climatic and other conditions are peculiarly favourable to the presence of mosquitoes in great variety and abundance. The mosquitoes of Colombo comprise at least 50 different species, of which no fewer than 15 are either dangerous or so numerous and troublesome as to be a pest". He recommended the passing of an Ordinance to deal with the prevention of mosquito breeding, but although such a measure has already been adopted in nearly every other tropical Colony in the Empire, no legislation has yet been sanctioned for Colombo. Major James calculated that provided an Ordinance such as he recommended were adopted, making the householder and land owner responsible for preventing the breeding of mosquitoes on his premises, a prevention staff of one special Inspector, two Sub-Inspectors, 32 Overseers and 40 coolies would be required to deal with Colombo, while without the backing of a special Ordinance, it would require not less than two Senior Inspectors, nine Sub-Inspectors, 130 trained overseers, 280 coolies, and several skilled mechanics.

The impossibility of being able to deal with the mosquito problem with the existing staff will thus be realised.

One of the difficulties, apart from the inadequacy of the staff for dealing with mosquito prevention in Colombo, is the existence of breeding places in inaccessible situations on high buildings, and with a view of preventing the number of such places increasing, the following intimation was sent, at the request of this Department, by the Works Engineer to all the architects and builders, *viz.*,—

WARNING.

PREVENTION OF MOSQUITOES.

It has been found that rain-water gutters are one of the most usual sources of mosquito breeding in Colombo—especially of the Stegomiya mosquito which is not only one of the most irritating biters, both by day and night, but is also the mosquito which carries the deadly yellow fever. The slightest obstruction in a rain-water gutter, as the result of sagging of the gutter or of blockage by dead leaves, dust, &c., invariably leads to the collection of rain-water in which these mosquitoes breed rapidly and become a source of torment to the residents.

With a view to preventing this very great source of nuisance, all architects and builders are warned to on no account provide rain-water gutters on high roofs or in other places which are difficult of access.

In this mosquito infected town the only situation where rain-water gutters are justifiable is on the eaves of porches under which people have to pass on entering or leaving the house.

21. **Food inspection.**—This important branch of the Public Health Department work is still in the same unsatisfactory state, no special food inspector having yet been sanctioned although the appointment of such an officer has been repeatedly urged.

Under existing conditions the time of the Sanitary Inspectors is necessarily to a large extent occupied in dealing with the innumerable details connected with nuisances, infectious diseases, buildings, &c., and they have consequently little time to give to food inspection which has however to be attended to as far as possible at the Customs, the Granaries, in the public markets, boutiques, &c.

22. **Cost of living.**—The following statements which represent in condensed form the particulars given in the Report for 1919, brought up-to-date, show that although the cost of food has dropped considerably in so far as the working classes are concerned, the cost of clothing and house rents has gone still higher than in 1919. The drop in the cost of food is the result of the fall in the price of rice.

The figures given in these statements represent averages which were obtained by tabulating scores of particulars collected during May, 1921, by 14 Sanitary Inspectors in all the different wards of the town, and may therefore be accepted as fairly representative :—

A.—COST OF FOOD, PER DAY.

	Prices in 1914.	Prices in 1919.	Prices in 1920.	Percentage increase in 1920 as compared with 1914.
	cts.	cts.	cts.	
A Sinhalese man in Colombo feeding at eating houses ...	36	72	52	44 per cent.
A Cochin man living in a chummery ...	35	58	45	29 per cent.
A married man with wife and two children living in the central wards ...	83	1/29	98	18 per cent.

B.—INCREASE IN HOUSE RENT IN COLOMBO.

	Rent in 1914.	Rent in 1919.	Rent in 1920.	Percentage increase in 1920 as compared with 1914.
	Rs. c.	Rs. c.	Rs. c.	
One room tenement ...	2 93	3 86	5 00	71 per cent
Two room tenement ...	5 28	7 04	8 25	56 ,,
Three room tenement ...	8 38	11 07	12 75	52 ,,
Houses of slightly better class ...	14 70	20 42	22 75	55 ,,

C.—PRICE OF CLOTHING.

	1914. (Average)	1919. (Average)	1920. (Average)	Percentage increase in 1920 as compared with 1914.
	Rs. c.	Rs. c.	Rs. c.	
Banians, (gauze) each ...	50	1 17	1 14	128
Banians (cloth) each ...	33	67	1 08	227
Shirts, (cloth) each ...	62	1 25	2 65	327
Chintz, per yard ...	30	97	98	226
Long cloth, per yard ...	40	1 15	95	138
Grey cloth, per yard ...	39	90	90	131
Sarongs, (Linen) each ...	71	1 56	2 25	217
Sarongs, (Palay Carta) each ...	2 50	4 25	5 45	118
Camboys, each ...	1 69	3 75	4 68	177
Vateys, each ...	87	1 50	2 59	196
Belts, each ...	47	80	1 08	129
Cannanore, (Colombo) per yard ...	55	80	1 25	127
Cannanore, (Madras) per yard ...	75	1 25	1 53	104
Towels, each ...	87	1 52	1 18	36
Drill, per yard ...	28	90	80	186
Coats, each ...	2 00	4 00	4 88	144
Handkerchiefs, each ...	23	60	48	104

23. **Vagrancy in Colombo.**—The following summary shows the state of the town as regards vagrancy during the last four years. It will be seen that there was a great increase during 1919 and 1920:—

	1917.	1918.	1919.	1920.
Number of vagrants admmitted to House of detention	266	259	799	794
Number deported to India	74	64	225	308

24. **Dairies and Milk Supply.**—There were 43 registered dairies on record at the end of the year, 14 having been discontinued and 13 new ones licensed.

The milk supply during the year was very unsatisfactory, especially in the matter of adulteration, as the following shows :—

MILK ADULTERATION, 1907—1920.

Year.	Samples analysed.	Samples adulterated.	Percentage of samples found to be adulterated.
1907	89	65	73
1908	—	—	no record.
1909	592	317	53
1910	1026	243	24
1911	1100	182	16
1912	1200	150	12
1913	571	57	10
1914	405	49	12
1915	518	80	15
1916	473	64	13
1917	457	75	16
1918	428	68	16
1919	338	80	23
1920	563	209	37

The ordinary milkman has no sanitary conscience and will abstain from adulteration only in proportion to the closeness of the supervision exercised over him, and the effectiveness or otherwise of the penalties imposed upon him when he is detected and convicted in the Municipal Court.

In the absence of a special food inspection staff the Sanitary Inspectors have to do all the milk sampling in addition to their other multifarious duties, so that when their attention is distracted, as it has been since 1913 by Plague, riots, rice troubles, influenza, smallpox, and Census work, the supervision exercised by them over the dairymen necessarily suffers, with the result shown in the statement above. The exceptionally bad results in 1919 and 1920 are believed to be in a large measure due to the inadequacy of the penalties imposed during those two years in the Municipal Court, experience in the past having clearly proved that the most effective way of checking this dangerous practice of adulteration is the imposition of heavy penalties upon every case detected.

By far the worst offenders in the matter of adulteration are the unlicensed vendors, of whom there are a considerable number, especially in the Cinnamon gardens where they graze and keep their cattle on such places as the race course, the golf links and in private compounds.

The householders themselves are entirely responsible for the persistence of this illicit and dangerous trade, inasmuch as they patronise these unregistered dealers. If they refused to deal with them that form of trade would automatically cease, and the whole of the trade would necessarily gravitate into the hands of the licensed dealers ; but they continue to employ them in spite of the warnings issued by the Public Health Department. The remedy is in their own hands and is a simple one. All they have to do is to insist upon their milkman producing his registration card, which by law every licensed vendor is bound to carry on his person when engaged in his trade. It would materially assist the Public Health Department in its attempts to cope with this nuisance, if householders would at once inform the Medical Officer of Health of any attempt by an unlicensed vendor to supply milk to them.

Bad as was the state of the milk supply during the year it would undoubtedly have been worse but for the emulation created by the efforts of the Colombo Ladies League whose work, carried out at times under very trying circumstances, is gratefully acknowledged.

25. **Bakeries.**—Three bakeries were discontinued, while 9 new ones were registered, leaving a total of 43 on the register at the end of the year. The state of the Bakeries was fairly satisfactory, but much difficulty is experienced in keeping them up to the mark especially in the matter of the personal cleanliness of the workmen, and maintaining the buildings in a state of repair. Here again we have been materially assisted by the Colombo Ladies League.

26. **Eating-houses.**—There were 438 of these establishments on the register at the end of the year. They require a great deal of supervision to keep them up to the mark.

27. **Ærated water factories.**—There were 13 ærated water factories on the register at the end of the year. All the ærated water factories adopt some method of filtration with a view of eliminating suspended matter, practically all of which although of a harmless character, nevertheless detracts from the appearance of the waters. Upon examining the water in a number of these factories before and after filtration, the Municipal Bacteriologist reported that all of them, except in the case of one factory, showed that the so called filtration instead of purifying the water was adding pollution. The filters were accordingly cleansed and sterilized with satisfactory results. The use of these private filters is, for trade purposes, at present apparently a necessary evil, which however as the Municipal Bacteriologist reports, will it is hoped be rendered unnecessary before long by improving the filtration at Labugama.

28. **Slaughter-house.**—The sanitary condition of the slaughter-house is still unsatisfactory. The sheds are crude, ill furnished, and accessible to crows which create a nuisance, while the disposal of the drainage containing as it does a large admixture of blood and the intestinal contents of the slaughtered animals, is most unsatisfactory, and is responsible for much fly-breeding in the locality. It is however expected that the drainage of this establishment will shortly be connected to the recently constructed sewers.

29. **Laundries.**—There were 322 laundries on the register at the end of the year. Of all the trades in Colombo which come under the direct supervision of the Public Health Department the laundries are the most difficult to deal with, partly owing to their number, and partly owing to the ease with which they change from one place to another. The poverty of the ordinary dhoby also makes it difficult to get improvements carried out. The Council has however decided to erect a series of Municipal laundries supplied with town water, with a view of putting a stop to washing in the foul waters of the Lake and elsewhere, and the first of these was partially completed and opened on 1st December, 1920, at Wekande, Slave Island, the accommodation provided being 16 clean linen rooms, 14 soiled linen rooms, and 14 tanks.

30. **Cemeteries.**—The condition of the Cemeteries has been much improved during recent years. Madampitiya from being a jungle covered waste has been converted by Mr. La Brooy into one of the most beautiful gardens in Colombo.

Liveramentu is similarly being reclaimed and it is already becoming a beauty spot instead of a snake infested jungle.

Kanatte has been much improved since Mr. Herft took charge.

31. **Municipal dispensaries.**—There are three of these institutions situated at
Union Place, Slave Island,
Barber street, St. Paul's,
Demetagoda road, Maradana.

The following statement shows in brief the work done at each :—

STATEMENT OF WORK DONE AT THE SLAVE ISLAND DISPENSARY, 1920.

Number of patients treated	14,726
,, visits by patients	30,181
Daily average attendance	100
Number of outdoor visits paid by the Medical Officer	87
,, Municipal employees treated	61
,, confinement cases visited by the Medical Officer	31

Health Visitors.

Number of visits paid to houses	14,852
,, houses where instructions re infant feeding given	2,569
,, visits to hand fed children	573
,, labour cases visited	62
,, dispensary tickets issued	3

STATEMENT OF WORK DONE AT ST. PAUL'S DISPENSARY, 1920.

Number of patients treated	15,416
,, visits by patients	18,616
Daily average attendance	60
Number of outdoor visits paid by the Medical Officer	220
,, Municipal employees treated	132
,, confinement cases visited by the Medical Officer	382

Health Visitors.

Number of visits paid to houses	40,336
,, houses where instructions re infant feeding given	2,150
,, visits to hand fed children	690
,, labour cases visited	138
,, dispensary tickets issued	26

STATEMENT OF WORK DONE AT MARADANA DISPENSARY, 1920.

Number of patients treated	6,002
,, visits by patients	11,182
Daily average attendance	36
Number of outdoor visits paid by the Medical Officer	89
,, Municipal employees treated	9
,, confinement cases visited by the Medical Officer	32

Health Visitors.

Number of visits paid to houses	32,097
,, houses where instructions re infant feeding given	2,067
,, visits to hand fed children	657
,, labour cases visited	20
,, dispensary tickets issued	85

32. **Municipal Enteric Hospital.**—53 cases were admitted during the year as against 68 in the previous year, while there were 9 remaining from the previous year, making a total of 62 cases treated during the year.

In addition 12 cases were sent in which were found not to be Enteric.

30 of the cases treated were males and 32 were females. Of these 41 were discharged as cured, 12 died, and 9 remained at the end of the year. The case mortality in the Hospital was thus 19·3 per cent, in which connection See section 12 (*a*).

33. **Staff changes.**—The writer was absent on leave in England from 10th May, to 8th November, 1920, during which period Dr. Aserappa acted as Medical Officer of Health. Mr. Philip Perera, typist resigned and his place was taken on 21st January, 1920, by Mr. J. V. Mendis. Mr. A. B. Brohier, Keeper of Liveramentu Cemetery, resigned and his place was taken on 16th February, 1920, by Mr. A. C. Solomonsz. Midwife A. M. Perera was dismissed on 8th July, 1920, and her place was taken by Mrs. D. B. Dias.

WM. MARSHALL PHILIP,
Medical Officer of Health.

MALIGAKANDE,
13th June, 1921.

Annexure (A.)

From the MUNICIPAL BACTERIOLOGIST, COLOMBO, to the MEDICAL OFFICER OF HEALTH, COLOMBO.

Colombo, 21st March, 1921.

SIR,

I HAVE the honour to forward herewith the Annual Report of the Municipal Bacteriological Laboratory for 1920.

I am, &c.,
L. F. HIRST,
Bacteriologist.

MUNICIPAL BACTERIOLOGICAL LABORATORY, ANNUAL REPORT, 1920.

1. During the years of my service with H. M. Forces little but routine work was done at the laboratory. The sum of Rs. 1,000 per annum allowed for maintenance during this period only covered actual cost of expenses incurred on laboratory account with local firms. Scarcely any repairs were done; the pre-war stocks became gradually depleted.

All repairs to apparatus which could be executed locally have already been completed. We still await the return of sundry implements on repair in Europe. Our stocks of laboratory material will soon be completely replenished in spite of the great delay in delivery of goods indented for in Europe. The necessary apparatus required to bring the equipment of the laboratory up-to-date has been ordered. The laboratory building has been renovated and partially refitted.

Apart from the lack of space and low gas pressure the Council will soon possess a completely satisfactory laboratory for all purposes of Public Health Bacteriology. The above mentioned defects can only be satisfactorily remedied in an extended building.

2. *Staff.*—During the war the services of the Second Assistant and of one Attendant were retrenched.

I can carry on, if the present staff be supplemented by a good personal Attendant till the finances of the Council permit the engagement of an additional Assistant with a sound training in Elementary Science. It will be necessary from time to time, to engage additional labour temporarily to meet emergencies.

3. *General arrangements.*—As at present organised, laboratory work can be divided into two sections, routine and special. The former is done by the Senior Laboratory Assistant and subordinate staff under the supervision of the Bacteriologist. The latter is done almost entirely by the Bacteriologist himself. The character of the special work is broadly outlined under separate heads as follows. It will be seen that it is mainly original research having an immediate practical bearing on public health problems in Colombo.

4. *Water supplies.*—An investigation is being carried on in association with the Waterworks Engineer and the City Analyst into the cause and prevention of the incrustation of the City water mains. The removal of this incrustation by mechanical means is very expensive and in some cases impracticable, *viz.*, 30 in. steel main from Labugama. There could be a great saving if it could be prevented from forming in the pipes.

The investigation begun in 1914 and interrupted by the war has made great progress during the year.

A large amount of experimental work has been done not only in the Municipal Laboratory at Colombo but also at a temporary laboratory established at the Waterworks at Labugama.

The co-operation of Scientists outside Ceylon has been secured. Dr. David Ellis is working in Glasgow on specimen of Iron Algæ forwarded from this laboratory. As regards the Polyzoa, the other principal factor in the formation of this incrustation, we are indebted to Sir Sydney Hamer, F. R. S., and to Dr. Annandale for valuable help in the identification of the various species.

Biologically and chemically the incrustation of the Colombo water mains presents problems of great complexity and considerable scientific interest. The economic problem is already solved in principle but many practical details remain to be worked out. This research is of economic importance not only to Colombo but to many other cities of the East and when complete will form the subject of a special joint monograph illustrated with charts, diagrams, schedules of bacteriological data and photographs and details of chemical analyses.

A brief outline will be given here of the discoveries made and the practical conclusions reached as a result of my investigations, supplemented by a series of chemical analyses of water samples taken under my supervision at Labugama and examined in the City Analyst's laboratory.

5. *The incrustation is doubly formed by the activities of both Polyzoa and various Algæ.*

This combination is by no means an unusual cause of trouble in water mains and service pipes.

The following table sets forth the best known instances recorded in the literature :—

TOWN.	GENUS OF POLYZOON.	GENUS OF ALGAE.	DISCOVERER.	DATE.
Hamburg	Cordylophora Paludicella Plumatella	Crenothrix	Kraepelin	1885
Rotterdam	Fredericella	Crenothrix	De Vries	1890
Boston, U. S. A.	Fredericella Plumatella	Crenothrix ?	Whipple	1896
Torquay	Plumatella	Crenothrix	Chapman	1910
Colombo	Fredericella Plumatella	Several species of Iron Algæ	Hirst	1914

It is only quite recently that systematic study has been made of the iron algæ, of which Crenothrix polyspora is the best known species. The term " Crenothrix " is very loosely used in Waterworks literature.

It is highly probable that the tropical Iron Algæ grow more luxuriantly in upland surface waters in the Tropics than the corresponding species in European waters. In the equable temperature of Low-country Ceylon, the Polyzoa do not apparently exhibit such a marked seasonal cycle of life as in Europe. Winter cold results in the death of the polyzoon moss. Fresh moss grows in the spring from the eggs or statoblasts released from the dead tubules of the zooid.

6. The family of Polyzoa is one of the most interesting branches of the animal kingdom. The mossy growth consists of branched tubules growing from a common stem in the form of a living tree.

Each branch is inhabited by a complete animalcule provided with mouth, stomach, rudimentary alimentary canal and genital organs. Its prey consists of micro-organisms, bacteria, etc., which are swept into the mouth by the movements of an array of tentacles which are protruded at intervals in the water. The whole form a colony of individuals housed in the branches of a common zoological tree which is itself alive. Polyzoa are most fascinating objects to watch under the microscope.

7. At certain seasons of the year, when the Labugama water level is rising rapidly, enormous quantities of polyzoon moss are arrested by the mechanical filters thereby imposing a great strain on the apparatus for washing these filters.

Formerly masses of polyzoa could be constantly seen passing over the spill into the Maligakande reservoir. They have now disappeared.

Living polyzoa are still found in old service pipes in the town and probably flourish in in dead ends of piping.

The inhabitants of Colombo must in times past have consumed great quantities of polyzoa in drinking water. The organism is probably quite harmless. In the living state it probably helps to purify the water by feeding on its contained microbes. When dead the products of its decomposition are liable to affect the taste of the water and give rise to excessively high bacterial counts in the water supply since these products form a food for both bacteria and algæ.

Thus the animal element of the crust-formers reacts upon the vegetable element and vice versa. This is a striking example of the biological phenomenon known as symbiosis.

Polyzoa have also been observed growing on the walls of the wash water tank at Labugama. This tank supplies filtered water for washing the filters.

Steps have been taken to prevent this occurring again.

At the end of one series of expriments at Labugama the settling basin was emptied and swept out. On inspecting the interior I found the walls of the tank covered with a gelatinous layer of Iron Algæ everywhere beneath the water level except near the lake end. Here the walls were completely covered with the tubular nests of the myriad larvæ of a dipterous insect.

Insect larvæ are often to be seen burrowing actively on the surface of the sand filters.

Everything necessary for the formation of the incrustation is to be found growing in the Purification Works.

The primary source of these organisms is of course the Labugama Lake itself.

The water at the lower levels of the lake is rich in iron algæ. I have not yet discovered where the polyzoa grow.

The complexity of the biology of the Colombo Waterworks will now be realised.

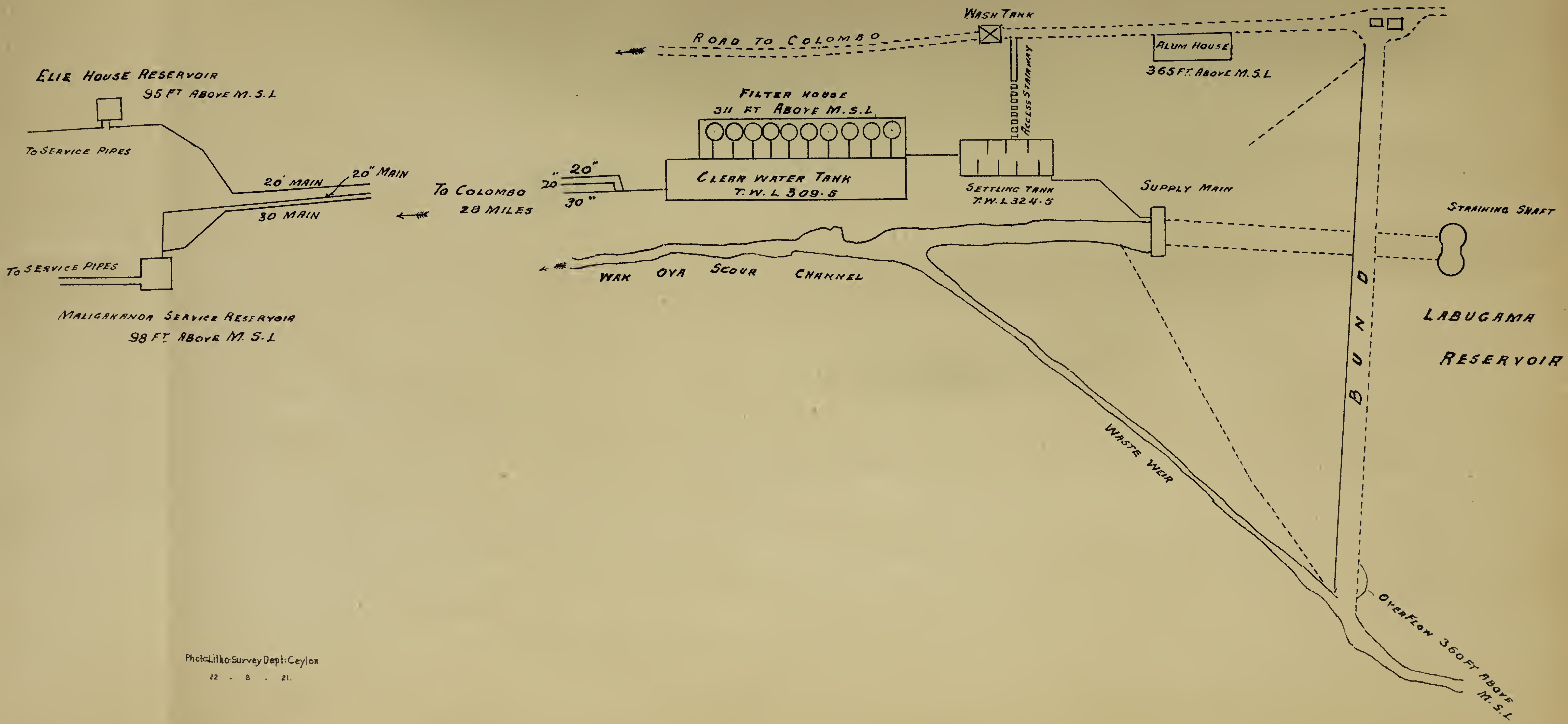


Photo Litho: Survey Dept: Ceylon
22 - 8 - 21.

In addition to two species of polyzoa, there are several species of Iron Algæ of the genera, Spirophyllum, Gallionella probably Crenothrix and other undetermined species. Entangled in the meshes of the growth are numerous unicellular algae, particularly Staurastrum, protozoa, such as Amœbæ, Crustacea and small oligochaete worms.

Many of them play a part direct or indirect in the formation of the incrustation.

8. *It has to be remembered that the bulk of this incrustation is composed of the dead remains of once living organisms.*—If a section of an old service pipe be taken it will be found that the pipe itself and its protective coating are intact. Next to the coating is a thick black layer of organic matter impregnated with iron ; within this again is a thin crust of rusty colour and uneven surface, consisting mainly of iron oxides. Next to the water is usually found the thin gelatinous layer of living organisms whose activities have formed the whole deposit. The whole incrustation can be more or less completely removed by scraping and flushing in the case of mains large enough to admit a scraper. Small mains have to be relaid.

Before the installation of the filters it took about nine years to reduce the calibre of a three-inch pipe 2/3 of its original diameter.

9. *The rate of formation of the incrustation is dependent on the rate of flow of the water through the pipes.*—The faster the flow through the pipes the less the incrustation.

Incrustation only forms under experimental conditions if the rate of flow is reduced to a minimum. Polyzoa are specially easily detached from the walls of pipes by rapid flushings of water. A good pressure in the service pipes helps largely to prevent incrustation.

It follows that higher service reservoirs would be an advantage from this point of view.

10. *Filtration of the water diminishes the rate of formation of the incrustation.*—In Europe main reliance has hitherto been placed on efficient filtration for the prevention of growth in water mains.

The incrustation has been cultivated experimentally on the walls of a pipe in the Municipal Laboratory on two occasions. Water is allowed to flow through the pipe continuously at a low velocity of flow. The first experiment took place in 1915 before the filters were in operation; it lasted for three months and ceased on my departure on active service. The second experiment began in February, 1920, and is still in progress.

There can be no doubt that the rate of incrustation has been much reduced. In the first trial polyzoa predominated over the algæ. No polyzoa have yet grown in the course of the second experiment. The growth is in the main algæ with the usual admixture of protozoa and crustacea.

The appearance of the experimentally formed incrustation corresponds exactly with that of the inner two layers of the incrustation found in service pipes.

Experimental observation pipes have been installed at Labugama. Unfiltered water flows through one, filtered water through the other at the same rate. The pipes are duplicates of one another. There is already a marked difference in favour of the filtered water.

The nett results of the operation of the Jewell Mechanical Filters to date are that the growth of Polyzoa in the main pipe line from Labugama has been prevented. The algal incrustation has been diminished but not prevented throughout the system.

11. An extensive series of experimental tests of the efficiency of the mechanical filters have been made under different conditions. The purpose of these filters is three-fold :—

1. To remove suspended matter.
2. To filter off the crust forming organisms.
3. To filter off excess of water bacteria and B. Coli.

The first purpose is fulfilled at Labugama. Unfortunately the water as delivered to the consumers often contains excess of suspended matter which has been washed off the walls of the pipes. *This suspended matter will disappear when the crust-formers have been eliminated by suitable treatment. It will then be possible to abolish numerous insanitary filters in Ærated Water factories and public and private premises.*

The second purpose as already mentioned has been partially achieved.

The algal filaments and the developed polyzoon moss are arrested on the surface of the filters but their spores and eggs get through in appreciable quantities.

12. *The third purpose is very inefficiently performed.*—The performance of filters of every description is usually gauged by bacteriological methods; if the filter will arrest bacteria it will also arrest the larger forms of life found in water.

During the war I controlled one of the largest Jewell Filter Plants on behalf of the Military Authorities. The results, though not entirely satisfactory, were far better than those given by the Jewell Plant at Labugama. Jewell filters are capable of giving excellent results under suitable conditions. In the above tests the customary methods were employed.

I have applied a new experimental method for testing the Council's filters which is free from certain fallacies inherent in the usual tests. The Labugama filters being impregnated with organic matter constantly contain bacteria. The number of microbes in the lake water is often very low. The result is that the filtered water contains more bacteria than the water from the lake, having taken up more organisms in passing through the filter than were caught by its surface film.

Full particulars of these experiments will be given in the final report. I may mention in passing, that in carrying them out I frequently worked eighteen hours a day and used thousands of tubes of culture media and hundreds of plates.

13. *The reason for the bacterial inefficiency of the filters is the difficulty in obtaining a proper filtering scum on the surface of the sand.*—Slow sand filters depend on the formation of an organic film on the surface; without this film they are useless. Rapid mechanical filters

depend for their scum on an artificial coagulum, such as aluminium hydrate precipitated in the water by the action of salts of lime or alkali salts on alum or alumino-ferric. The natural plankton (higher organisms) assists the flocks of aluminium hydrate in the formation of the filter scum. Without a proper scum sand filters merely act as mechanical strainers for the removal of suspended matter and the larger oragnisms.

The plant at Labugama was designed for use with alum as a coagulant but owing to the peculiar chemical constitution of the water, alum cannot be used without extensive alterations to the filter plant.

Reliance is being placed on the natural plankton of the water for the formation of the scum. This varies greatly, however, at different seasons and different levels of the water. Plankton is excessive and chokes the filters rapidly at the height of the rains and is very scanty in the surface water during dry weather. Under the most favourable circumstances working only with natural plankton, a large proportion of bacteria pass through the filter.

A series of tests with alumino-ferric precipitated with the equivalent amount of soda gave satisfactory results when the treated water was applied direct to the filters; but the method choked the filters rapidly even with small doses of alum and is therefore impracticable.

14. *Another grave difficulty for efficient bacterial filtration is the insufficient number of filters.*—Already all ten filters are being worked with the Weston Controller full open so that there is little margin for emergencies. If an efficient coagulant is used the loss of head is rapid, the filters quickly choke and the water in the clear water basin falls to a dangerous level. The clear water basin is too small to allow of frequent washings. It contains 800,000 gallons; each washing uses up 250,000 gallons of filtered water.

15. *I recommend therefore that the filters be used simply as mechanical strainers.*—When the new screens are in position at the straining tower the filter will be considerably relieved. It may be advisable to place a small set of emergency screens at the inlet to the settling basin for use in flood seasons when the water contains unusually large amounts of suspended matter.

16. I have already shown that the surface layers of the lake are purer bacteriologically than the deeper. This is the natural result of the action of sunlight and sedimentation. (Indian Journal of Medical Research, Papers of All-India Sanitary Conference, Lucknow February 1914.) At present the drawoffs from the lake are situated at the 11 feet and 23 feet levels.

By means of a hinged floating arm in conjunction with additional drawoffs the water could be continuously drawn off near the surface. Such water could be filtered at a much greater average speed. *At some seasons of the year no filtration would be necessary.*

17. By the above means in conjunction with chlorination I believe the *Council can be spared the expense of extensions to the filters and the present plant improved in practical efficiency.*

Chlorination of the raw water would not only disinfect and stop the growth of organisms in the purification works, but would also increase the velocity of filtration by preventing growth in the deeper layers of the filter sand.

Treatment with Copper may possibly serve the same purpose.

A section of one of the filters made by the City Analyst and myself showed that the filters were deeply impregnated with organic matter.

18. I carried out a series of experiments with Fluorescein in August 1920; this harmless substance can be detected in very minute quantities by the naked eye in water. The principal result of these experiments was the demonstration that the circulation of water in the *settling basin is insufficient.* Fluorescein introduced from the alum house into the pipe leading to the settling basin appeared at the outlet in about half the calculated time, showing that some of the water takes a short cut along the tank.

The settling basin is too small for the complete elimination of obnoxious colloids by precipitation before the water reaches the filters; it only holds one and a half hour's supply. The interaction between coagulants and colloids in the water takes time to produce its full effect. The more complete the clumping the more easily are micro-organisms filtered off.

There is no meter on the purification works at Labugama. The fluorescein tests in the filter house were a useful check upon the estimated daily flow of water through the works.

19. In order more effectually to carry on the series of observations made at Labugama during August—September and early October, 1920, I established a temporary laboratory in a building adjacent to the alum house and lived in the Waterworks Bungalow.

20. *The water was limed experimentally under my personal supervision at intervals during the month of September.*

Different doses of lime were used, the maximum being estimated at 4 grains per gallon. One experiment lasted a week during which time lime was added continuously day and night in carefully controlled doses. The lime used was prepared at the spot in the kilns built for the purpose by burning coral over firewood. It was hoped that the addition of lime alone would inhibit the growth of iron bacteria, precipitate the soluble iron constituent in the water which favours the growth of these bacteria and that the precipitate would assist in the formation of a proper filter scum on the surface of the filters. *Laboratory experiments show, however that large doses of lime do not arrest the growth of some of the algæ derived from the incrustation.* The effect of lime in this respect is only partially beneficial. This was confirmed by observations on samples of limed water before and after filtration. With the largest dose of lime used, growth appeared in the treated water though not so abundantly, as in samples of lake water taken the same day. Analyses of these samples in the City Analyst's laboratory showed, contrary to expectation, that the dissolved iron was not eliminated.

I could detect no appreciable improvement in the bacterial efficiency of the fitters as the result of adding lime. Moreover, owing to the extreme softness of the Colombo water supply a large proportion of the added lime appeared as free caustic alkali in the water. Thus during the 4 grains per gallon experiment, the City Analyst found 2·87 grains per gallon of total calcium oxide and free calcium oxide 1·80 in the filtered water. Part of this excess of caustic lime is absorbed before the water reaches the consumers.

21. It is advisable, however, not to supply diluted lime water to the consumers for any length of time. Internally there are probably no ill-effects from the consumption of water containing a slight excess of lime in the form of caustic alkali for short periods; but consumers with sensitive skins will be sure to object to using it externally. Tea tasters will object to the altered flavour of the water. When the lime treatment began there were complaints of an aromatic odour and unpleasant taste in the water, probably due to the solution of organisms killed by the free lime.

22. Excess lime (*i.e.*, free alkali capable of affecting indicators such as Phenolphthalein) is a very active bactericidal agent. Sir Alexander Houston introduced its use for sterilising water supplies on a large scale. Many Waterworks authorities have taken advantage of the method for safeguarding their supplies from the microbes of water-borne diseases.

It is customery to remove the excess by mixing the limed water with hard water purified by storage or else by carbonating with Carbon Dioxide gas. The latter is an effectual method of temporarily hardening soft water such as that derived from Labugama. It would be advantageous to slightly harden the Colombo water supply.

Intestinal organisms in the Colombo water supply can be killed rapidly with quite small doses of excess lime. After three hours contact with half grain per gallon excess lime, only spore bearers can be grown from Colombo water containing 300 ordinary water bacteria per c.c. and 30 coli form lactose fermenters per c.c.

Exccss lime is therefore an economical method of sterilising the water qua ordinary bacteria owing to the small amounts of total lime required.

It is unfortunate that some of the iron algæ can grow in the presence of caustic lime in this particular water.

The Colombo supply was never so satisfactory from a purely bacteriological point of view as during these experiments.

23. The physical appearance of the water, colour and transparency were improved by liming, probably as a result of the precipitation of colloid matter in the settling tank. Some of this matter was deposited on the bottom of the tank, the rest was caught by the filters.

24. *Laboratory experiments on the chlorination of the Colombo water supply have given encouraging results.*—The problem of using Chlorine for preventing the growth of crust-forming organisms is not nearly so simple as its use for destroying the microbes of water-borne diseases. However, carefully the various tanks, service reservoirs and main pipe lines are scraped and cleaned as a preliminary to the treatment, some small masses of growth will remain. It takes much longer for chlorine to penetrate into the interior of such masses than to kill the free floating microbes of water-borne diseases.

Moreover the iron algæ form spores and the polyzoa statoblasts which are relatively resistant to the action of disinfectants.

Dead organic matter attached to the pipe walls will absorb considerable amounts of chlorine.

25. *I find that to definitely arrest the growth of these iron algæ, chlorine must be added till a marked permanent excess is present.*—A temporary excess often disappears in a few hours as a result of the slow absorption of the chlorine by the algal protoplasm.

A 1% suspension of algæ will absorb more than 20 parts of chlorine per million of the water.

26. To actually disinfect water mains by this means after scraping, it will be necessary to treat seperate sections of mains with large doses intermittently followed by vigorous flushing after each treatment. Any taste subsequently developing could be removed by addition of small quantities of Sodium Thiosulphate and traces of Sodium Permanganate.

Though the above seems rather complicated it would not be an expensive proposal and would not take up much time or labour to carry out, as compared with mechanical methods. Once the growth was definitely arrested it would be a comparatively simple matter to prevent its recurrence.

27. The problem would be considerably simplified if a convenient means could be devised for eliminating the iron containing substance in the water. The iron is probably in combination with an organic molecule.

I am experimenting on these lines. Less chilorine would be required if these experiments were successful.

28. The necessary chlorine could be generated electolytically at Labugama. There is ample power available through the fall of seven million gallons of water per diem from the lake to the settling basin. A small turbine would do the work. An alternative method is to use a liquid chlorine apparatus. This is the method now generally adopted in Europe and America. The water supplies of many large cities including New York are disinfected by this means. The London supply is chlorinated by bleach and liquid chlorine.

The difficulty of importing the cylinders of liquid chlorine from Europe is an objection to its use in Ceylon.

The method has the great advantage, however, of ease of application, low capital charges and accuracy of dosage. Moreover the apparatus could be made transferable as was done during the war on the Western front.

29. I propose to start experiments as soon as possible on the application of chlorine in the form of bleaching powder to the raw water at Labugama before filtration. There has been great delay and difficulty in procuring the bleach owing to the objection of shipping agents to transport such cargo.

30. It is interesting to note that Sir Alexander Houston in his latest Research Report to the Metropolitan Water Board lays stress on the advantages of chlorination combined with rapid mechanical filtration for general purposes of water purification.

In my Memorandum No. 13 on the examination of the Colombo Water Supply dated 17th February, 1920, I suggested chlorine as the most promising agent as an adjunct to filtration.

Researches into methods for improving the water supply seem to have been proceeding on somewhat similar lines in Colombo and London.

31. Experiments with various concentrations of Chloramine produced by Race's method from the interaction of Chlorine and free Ammonia have given good results in the Laboratory for preventing the growth of iron Algæ. On the other hand an experiment with Chloramine Tin similar concentrations gave entirely negative results.

32. When the chlorine series of experiments is concluded a final series of tests will be done with salts of copper.

Copper Sulphate is extensively used as an Algicide in the United States of America for keeping down growth in reservoirs. Great care is necessary in its application since by altering the balance of nature among the water organisms it sometimes leads to excessive after-growths of certain forms of life.

Copper salts have a decided effect on the Iron Algæ. I have not yet sufficiently investigated their action on this element of the crust formers to justify any definite statement.

I strongly advise against any large additional expenditure on treatment works till all available methods of improving the water supply have been thoroughly investigated.

33. *Plague.*—The parasitology of Plague in Colombo has received special attention this year. It is gratifying to learn that the earlier work published from this Laboratory has now been fully confirmed by other investigators. The results of further researches will be published in the scientific journals in due course. There seems to be a great deal of misunderstanding and misconception about Plague in Colombo. I propose to bring up the matter to the notice of the local branch of The British Medical Association.

34. *Cattle Diseases.*—During the year I have been associated with the Government Bacteriologist and the Municipal Veterinary Surgeon in the work of the Rinderpest Committee. We succeeded after much experiment, in preparing an efficient Anti-rinderpest Serum.

The incidence of Rinderpest among the cattle of Ceylon has been exceptionally heavy of recent years. The disease is attended by a mortality of abont 80 % and has caused considerable economic loss.

The Committee agreed that the present methods of quarantining imported Indian cattle are very unsatisfactory, and recommended the establishment of a Modern Quarantine Station at Tuticorin. The double inoculation against Rinderpest of all cattle imported into the interior of the Island was recommended.

The principle of the double inoculation method is to inoculate the animal on one side with the virulent blood of a Rinderpest-infected bull and on the other side with a sufficient dose of anti-rinderpest serum to modify the disease to a mild form without danger to the life of the animal. The dose of serum required varies with the particular breed of cattle.

On recovery the beast is immune to Rinderpest for several years, whereas the injection of serum alone (single inoculation method) only protects for a few months. The double inoculation method is however attended by certain dangers.

1. The mild form of Rinderpest which is produced is infectious and may give rise to ordinary Rinderpest among cattle who have not received a dose of serum. Special precautions are therefore necessary to prevent the spread of the disease in the neighbourhood of the inoculating stations.
2. A certain number of the more susceptible or debilitated cattle die from the effects of the double inoculation. In other countries the number has been estimated at 1 % of the total number of cattle doubly inoculated. Special caution would be necessary in immunising English and Australian cattle by this method. These breeds are usually valuable and are excessively susceptible to Rinderpest.
3. I detected the parasites of Surra and Red Water Fever in cattle at the Quatantine Mart.

   If these diseases turned out to be extensively prevalent among the cattle of the Island it would be difficult to obtain suitable bulls for the supply of the necessary Rinderpest virus since the blood of the animals used for this purposes must be free from living organisms other than those of Rinderpest.

The question of the advisability of a general campaign against Rinderpest by the double inoculation of domesticated cattle throughout the Island was much debated.

Apart from the dangers already mentioned there are grave administrative difficulties. It would not be easy to round up the cattle in the face of opposition by their owners.

Great care would be needed to avoid paralysing transport in any given district by inoculating too large a proportion of the cart bulls at one time.

My own view is that we need more exact information as to the prevalence of Rindepest, Surra, Red Water Fever and other blood infections of cattle in Ceylon.

I suggested a special veterinary survey of the Island from these points of view.

If the loss of cattle due to Rinderpest in a period of epidemic prevalence greatly exceeds the loss from the effects of the double inoculation and if the difficulty of obtaining suitable virus producers can be overcome, then I am in favour of the proposed campaign. The evidence seems to suggest that there are epidemic waves of Rinderpest in Ceylon, recurring at intervals of about 10 years. If so, the campaign should precede the next wave.

A preliminary small scale campaign would be necessary to throw light upon administrative difficulty and to enable an exact estimate to be made of the loss of cattle from the effects of double inoculation.

It would certainly be an advantage to prepare anti-rinderpest serum locally and to keep a large reserve of it in stock against recrudescence of the disease.

A considerable amount of Anthrax is still found among imported goats and sheep. Blood from the ears of all dead goats and sheep is examined at the laboratory.

35. *Enteric Fever.*—The Public Health Department investigated an outbreak of Typhoid Fever at a boarding house in Colombo by modern methods. The result was very interesting and affords a good example of bacteriology as applied to Public Health. The way in which it was traced to its source, namely, a typhoid carrier will be described by the Medical Officer of Health in his Annual Report.

36. *Dysentery.*—An attempt has been made to carry on the researches on Dysentery which I partially completed in Egypt in 1916–1917–1918, working in conjunction with other bacteriologists attached to the Eastern Expeditionary Force. Many of the results have already been reported (Lancet 20-4-18 and 5-10-18.)

The regrettable absence of enthusiasm for scientific medicine in this colony is a serious obstacle to researches of this description which need the co-operation of clinical experts.

The investigation of Diarrhœal diseases in general and of the Continued Fevers of intestinal origin is greatly handicapped by the lack of facilities for research in clinical bacteriology.

37. *Ærated waters.*—A recent bacteriological survey of the Ærated waters manufactured in Colombo, gave interesting results. The method of filtration generally adopted at the works proved to be inefficient. The water coming from the filters contained many more organisms than the water supplied to the factory.

Steps have already been taken to remedy this state of affairs. Subsequent tests showed a marked improvement in the bacteriological results. These filters will be unnecessary, when as a result of our researches on the Incrustation of Mains, we are able to get rid of the suspended matter in the Town Water.

38. *Milk.*—A few samples of milk purchased at random gave bacteriological results which compare favourably with similar samples examined in England.

39. *Diagnostic service for Medical Practitioners.*—The free examination of bacteriological specimens sent in by the Colombo Medical Practitioners continues. Insufficient advantage is taken of the service ; when the equipment and the staff of the laboratory are in a wholly satisfactory condition I propose to suggest that fresh leaflets on clinical bacteriology be circulated among the practitioners concerned.

40. *Vaccines.*—A reserve stock of Anti-influenza Vaccine amounting to 1,000 doses has been prepared. I am indebted to the Director, Paral Institute, Bombay for several strains of Pfeiffer's Bacillus used in making up this vaccine.

Large stocks of Anti-typhoid Vaccine manufactured in the laboratory are now available.

Arrangements have been made for free inoculation of Municipal employees at the Laboratory, for free issue of vaccine to the Municipal Dispensaries for free inoculation of any applicants.

Vaccine has also been issued to Medical Practitioners and a firm of Pharmacists in Colombo at low cost, private persons who so desire can be inoculated by me at the Laboratory on payment of a small fee.

41. *Specimens submitted for examination.*—An average amount of routine work has been done this year. The daily examination of rats for Plague is the main item.

There is evidence that the type of rat plague, like that of human plague is becoming more bubonic and proportionately less septicæmic. I propose to investigate this point next plague season by exact methods. If this hypothesis is correct the microscopic examination becomes a less reliable index to rat plague and factor of correction deduced from the macroscopic appearances will need to be introduced.

In Bombay, where rat plague is mainly, if not, entirly bubonic, reliance is placed on the macroscopic examination alone.

At present we use a combination of the two methods, main reliance being placed on the microscopic examination of splenic smears.

Annexed are tables showing the character of the specimens received fron outside sources and some of the results obtained.

I was able to deduce a recrudescence of plague at the end of the year from a consideration of the flea index, incidence of plague among the rats and abnormal increase in the rat population during the off season.

One hundred and twelve samples of Town water were taken in the Town by the laboratory staff for the purpose of the monthly routine examination making the total number of routine examinations 21,801.

The very numerous samples of water taken for research purposes are not included in the annexed statement.

The research on the Filtration works at Labugama consumed great quantities of culture media thereby entailing special effort on the part of the reduced staff of Attendants.

Under the heading Miscellaneous in Statement I, are included 119 Japanese Shaving Brushes.

A Pseudo-anthrax Bacillus was isolated from these brushes which only differed from the typical organism in being non-pathogenic to the test-animals used. Similar strains of avirulent anthrax-like bacilli have occasionally been isolated by other observers from materials suspected to be infected with Anthrax.

STATEMENT I.

ANALYSES OF SPECIMENS RECEIVED IN THE LABORATORY, 1920.

SOURCE.	EXAMINED FOR.	SPECIMENS OF.	NO. RECEIVED.	NO. POSITIVE.
Diagnostic service for practitioners.	Enteric	Blood	40	8
		Fæces	8	2
		Urine	13	3
	Tuberculosis	Sputum	28	5
	Dysentry	Fæces	16	8
	Diphtheria	Throat swabs	4	2
	Hookworm	Faeces	31	11
Municipal Enteric Hospital.	Enteric	Blood	51	25
		Fæces	3	1
		Urine	2	0
	Tuberculosis	Sputum	2	0
	Enteric Carriers	Blood	381	0
		Fæces	15	1
		Urine	27	2
	Enteric	Blood	11	0
		Fæces	8	0
		Urine	0	0
Public Health Department.	Bacterial count. .	Ærated waters	14	0
	Intestinal organisms	Well waters	4	0
	Deposit	Milk	15	0
	Human Plague	Spleens & Lungs	78	58
	Rat Plague	Dead rats	110	18
		Rats killed by Clayton Machines	2,828	61
	Leprosy	Nasal swab	1	0
	Cholera	Rectal swab	1	0
		Miscellaneous	126	0
	Anthrax	Ears of goats	447	352
Veterinary Dept.	Rat plague	Rodents	14,262	40
Port Commission	Rat plague	Rodents	3,163*	17
			21,689	614

* Include rodents from Manning Markets, Chalmers Granaries, Coaling Grounds, Walker's Iron Factory, Graving Dock, Customs Warehouses, Kochchikade Warehouse.

STATEMENT SHOWING DISTRIBUTION OF INFECTED RATS, 1920.

	Species.	Number examined.	Number infected.	Percentage infected.
Trapped rats	R. Rattus	12,223	41	0·33
	R. Norvegicus	3,372	17	0·5
	M. Musculus	1,349	1	0·07
	N. Bengalensis	12	0	—
	C. Coerulea	57	0	—
Rats found dead	R. Rattus	53	7	13·2
	R. Norvegicus	63	16	25·3
	M. Musculus	21	2	9·5
	N. Bengalensis	1	0	—
	C. Coerulea	0	0	—
Rats killed by Clayton Machines	R. Rattus	708	23	3·2
	R. Norvegicus	1,099	17	1·6
	M. Musculus	1,402	12	0·85
	N. Bengalensis	1	0	—
	C. Coerulea	2	0	—
	TOTAL	20,363	136*	0·66

* Exclusive of rats reported by Government Bacteriologist.

All rats found dead or killed by Clayton are examined. A representative proportion of the rats trapped in the various districts during the year are forwarded daily by each gang of rat destroyers.

FLEA INDEX.

Month.	Number. R. Rattus examined.	Flea Index.	Number R. Norvegicus examined.	Flea Index.
January	78	1·94	23	4·84
February	79	1·56	46	3·0
March	80	1·94	60	3·49
April	87	1·78	53	2·90
May	104	1·44	32	2·84
June	112	0·909	22	2·27
July	96	1·34	48	2·7
August	82	1·45	34	2·47
September	105	1·56	54	2·25
October	69	1·68	50	2·3
November	107	1·27	45	4·43
December	94	1·38	24	4·34

Annexure. (B)

From the CITY ANALYST, COLOMBO, to the MEDICAL OFFICER OF HEALTH, COLOMBO.

Colombo, 10th January, 1921.

ANNUAL REPORT.

SIR,

I have the honour to submit my yearly report for the year, 1920. Samples examined were as follows :—

	No. of Samples.
January.	
Milks ...	32
Well water ...	5
Town water ...	13
February.	
Milks ...	34
Well water ...	15
Town water ...	15
March.	
Milks ...	34
Town water ...	14
Well water ...	11
April.	
Milks ...	34
Town water ...	14
Well water ...	3
Coral Lime ...	2
May.	
Milks ...	41
Town water ...	14
Well water ...	2
Burnt Coral Lime ...	1
June.	
Milks ...	32
Town water ...	14
Well water ...	1
Burnt Lime ...	3
July.	
Milks ...	56
Town water ...	14
August.	
Milks ...	82
Town water ...	14
Labugama water ...	2
Lime ...	1
Soda Ash ...	1
Chlorogen ..	1
Sulphate of Alumina	1

	No. of Samples.
September.	
Milks ...	70
Town water ...	14
Well water ...	1
Labugama water ...	18
Sewages ...	10
Burnt Coral Lime ...	8
Alum ...	1
October.	
Milks ...	48
Town water ...	14
Burnt Lime ...	3
Chlorogen ...	1
November.	
Milks ...	46
Town water .	14
Well water ...	3
December.	
Milks ...	55
Town water ...	15
Well water ...	1
Total ...	827

		Suspicious.	Condemned.
Total No. of Milks.	563 ...	Nil.	209(=37%)
Total No. of Town waters.	189 ...	Nil.	Nil.
Total No. of Well waters.	42 ...	19	19
Miscellaneous.	33		

The Colombo milk supply is still unsatisfactory, 37 per cent of the milks tested were condemned as being adulterated with water. A few are deficient in fat or cream removed.

Town waters were all satisfactory.

Forty two well waters were examined, 19=45 % were considered suspicious.

Labugama Waterworks were visited several times. Experiments on the treatment of the City water supply have been carried out in conjunction with the Bacteriologist. The results of which will be embodied in a separate report.

Madampitiya sewage works were visited during the year. Samples of the outlets show satisfactory purification. Electrial preparation of Sodium Hypochlorite was attempted at Madampitiya with poor success.

Costs of Chemicals and Apparatus are almost prohibitive and often of inferior quality making Scientific work next to impossible.

I am, &c.,
A. BRUCE,
City Analyst.

Annexure. (C)

STATEMENTS.

No. 1.—(*a*) Average Monthly Mean Temperature at Colombo Observatory (C. G.)

Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
13	79·0	79·8	81·4	82·6	82·5	81·6	81·0	81·0	81·0	80·2	79·6	78·9	80·7

(*b*) Monthly Mean Temperature at Colombo Observatory during 1920.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1920	79·0	79·7	81·4	81·2	83·0	80·8	80·7	80·8	80·8	80·4	79·4	78·6	80·5

(*c*) Average Monthly Mean Pressure at Colombo Observatory (C. G.) Altitude 24 feet above Mean Sea Level.

Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
11-12	29·913	29·907	29·887	29·853	29·833	29·832	29·848	29·860	29·867	29·880	29·871	29·892	29·870

(*d*) Monthly Mean Pressure at Colombo Observatory during 1920.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1920	29·916	29·936	29·874	29·854	29·854	29·846	29·884	29·896	29·882	29·888	29·850	29·900	29·882

(*e*) Average Monthly Rainfall at Colombo Observatory (C. G.)

Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
13	3·10	1·94	4·27	7·67	12·79	8·09	5·84	2·64	5·29	13·48	11·06	4·69	80·86

(*f*) Monthly Rainfall at Colombo Observatory Cinnamon Gardens during 1920. Observatory Gauge 25 feet above Mean Sea level.

Year.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1920	0·83	3·36	5·95	14·77	8·68	17·44	2·54	0·94	2·04	15·27	14·49	4·42	90·73

(*g*) Average Monthly Mean Humidity at Colombo Observatory (C. G.)

Years.	Jan.	Feb.	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
12	76	76	78	79	81	81	81	80	80	83	82	79	80

(*h*) Monthly Mean Humidity at Colombo Observatory during 1920.

Year.	Jan.	Feb	Mar.	April.	May.	June.	July.	Aug.	Sept.	Oct.	Nov.	Dec.	Year.
1920	78	78	80	82	81	84	82	80	80	82	84	78	81

The Humidity in tables G. & H. is the mean of the Humidities derived from the Maximum both dry and wet and the Minimum dry and wet.

No. 2.—POPULATION.

Race.	Population estimated to middle of 1920.
All races	278,664
Europeans	3,894
Burghers	18,274
Sinhalese	125,010
Tamils	67,505
Moors	49,095
Malays	6,925
Others	7,967

No. 3.—AREA AND ESTIMATED POPULATION BY WARDS, 1920.

Ward.	Total area (in acres)	Nett available area (in acres)	Estimated population.	Density per acre of available area.
Fort	220	112	4,458	39·8
Pettah	92	67	10,112	150·9
San Sebastian	116	108	14,651	135·7
St. Paul's	143	135	31,392	232·5
Kotahena	1,649	1,056	51,476	48·7
New Bazaar	289	226	28,312	125·3
Maradana	1,297	1,025	55,522	54·2
Slave Island	313	304	27,905	91·8
Kollupitiya	1,928	1,655	31,777	19·2
Eastward Extension	1,593	1,593	13,854	8·7
Wellawatte Extension	620	620	9,205	14·8
The Lake	416	—	—	—
Colombo Town	8,676	6,901	278,664	40·4

No. 4.—BIRTHS. RACIAL BIRTH-RATES.

Race.	Average rate per 1,000 population, 1910—1919.	Births, 1920.	Birth-rate per 1,000 population. 1920.
All races	22·9	7,197	25·8
Europeans	21·4	69	17·7
Burghers	31·2	506	27·7
Sinhalese	28·7	4,223	33·8
Tamils	12·4	972	14·4
Moors	19·1	1,024	20·9
Malays	35·5	282	40·7
Others	14·4	121	15·2

No. 5.—WARD BIRTH-RATES.

Ward.	Average rate per 1,000 population. 1910—1919.	Births, 1920.	Birth-rate per 1,000 population, 1920
Colombo	22·9	7,197	25·8
Fort	2·3	8	1·8
Pettah	4·3	30	3·0
San Sebastian	18·2	251	17·1
St. Paul's	15·1	465	14·8
Kotahena	21·8	1,369	26·8
New Bazaar	20·9	607	21·4
Maradana	19·1	1,222	22·0
Slave Island	21·4	613	22·0
Kollupitiya	16·6	578	18·2
Eastward Extension	17·0	324	23·4
Wellawatte	25·2	291	31·6
Hospitals	—	1,439	—

No. 6.—COLOMBO WARD DEATH-RATES. (All causes.)

Death-rate per 1,000 population.

Ward.	(a) Average crude death-rate 1910 to 1919.	(b) Deaths, 1920.	(c) Death-rate (crude) 1920.	(d) Death-rate (corrected) for deaths in Hospitals 1920.	(e) Death-rate (corrected) for deaths in Hospitals 1919.	(f) Increase or decrease 1920 as compared with 1919.
Colombo	28·0	8100*	29·1	25·2	25·2	Same.
Fort	9·2	39	8·7	10·5	11·0	— ·5
Pettah	8·8	79	7·8	16·9	16·9	Same.
San Sebastian	20·8	238	16·2	20·1	21·3	—1·2
St. Paul's	21·1	628	20·0	24·6	23·0	+1·6
Kotahena	21·9	1153	22·4	26·6	25·8	+ ·8
New Bazaar	23·6	595	21·0	25·7	24·8	+ ·9
Maradana	21·3	1081	19·5	26·0	26·8	— ·8
Slave Island	20·9	604	21·6	25·9	25·3	+ ·6
Kollupitiya	15·6	592	18·6	21·9	21·4	+ ·5
Eastward Extension	15·5	237	17·1	21·0	23·6	—2·6
Wellawatte Extension	17·6	165	17·9	22·7	24·2	—1·5
Hospitals	—	2689	—	—	—	—

* Including 1088 deaths of non-residents of the Town.

No. 7.—RACE DEATH-RATES.

Colombo Racial Death-rates. (All causes.)

Death-rate per 1,000 population.

Race.	(a) Average crude death-rate 1910 to 1919.	(b) Deaths, 1920.	(c) Crude rate 1920.	(d) Rate corrected for deaths in institutions.	(e) Increase or decrease on the average (crude.)	(f) Decrease due to correction for institutions.	(g) Rate corrected for age and sex 1920.
All races	28·0	8100	29·1	25·2	+1·1	3·9	29·6
Europeans	18·2	57	14·6	9·5	—3·6	5·1	—
Burghers	22·4	385	21·1	20·6	—1·3	·5	—
Sinhalese	31·0	4284	34·3	27·0	+3·3	7·3	—
Tamils	25·1	1649	24·4	22·9	— ·7	1·5	—
Moors	25·4	1206	24·6	24·5	— ·8	·1	—
Malays	32·3	223	32·2	31·9	— ·1	·3	—
Others	34·2	296	37·2	32·5	+3·0	4·7	—

No. 8.—BIRTHS AND DEATHS BY WARDS. 1920.

WARD.	BIRTHS.										DEATHS.										Deaths of children under one year.
	Total Births.			Nationality.							Total Deaths			Nationality.							
	Persons.	Males.	Females.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	Persons.	Males.	Females.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.	
COLOMBO TOWN.	7197	3690	3507	69	506	4223	972	1024	282	121	8100	4549	3551	57	385	4284	1649	1206	223	296	1679
Fort and Galle Face	8	3	5	3	1	—	—	2	2	—	39	34	5	9	—	6	6	4	3	11	4
Pettah	30	19	11	—	1	21	2	—	—	6	79	63	16	—	1	20	23	24	—	11	17
San Sebastian	251	140	111	—	6	87	15	123	13	7	238	134	104	—	7	80	30	113	5	3	71
St. Paul's	465	256	209	1	7	112	188	133	2	22	628	349	279	—	10	131	296	163	3	25	190
Kotahena	1369	657	712	2	88	917	233	100	8	21	1153	587	566	1	72	735	232	85	9	19	298
New Bazaar	607	319	288	—	52	271	59	202	12	11	595	303	292	—	47	191	88	244	9	16	185
Maradana	1222	633	589	—	110	667	96	268	71	10	1081	562	519	2	71	514	150	255	54	35	319
Slave Island	613	298	315	3	36	234	85	99	137	19	604	329	275	3	25	194	115	122	107	38	168
Kollupitiya	578	281	297	35	78	308	82	44	15	16	592	317	275	14	51	343	120	49	9	6	119
Eastward Extension	324	171	153	6	10	257	35	5	7	4	237	115	122	—	10	175	37	9	2	4	79
Wellawatte Extension	291	159	132	3	37	190	32	23	4	2	165	88	77	1	15	99	32	16	1	1	54
Hospitals (Town residents)	—	—	—	—	—	—	—	—	—	—	1329	822	507	5	59	703	367	105	15	75	—
do (Untraced)	1439	754	685	16	80	1159	145	25	11	3	272	168	104	2	9	182	48	12	4	15	175
do (Non residents).	—	—	—	—	—	—	—	—	—	—	1088	678	410	20	8	911	105	5	2	37	—

No. 9.—Deaths of Males and Females at different age periods for each race in the Colombo Municipality during the year, 1920.

AGE AT DEATH.

RACE.	Under 1 year of age see particulars of statement.		UNDER 5 YEARS.								OVER 5 YEARS.																						TOTAL.		
			1 year & under 2.		2 years & under 3.		3 years & under 4.		4 years & under 5.		5 years & under 10.		10 years & under 15.		15 years & under 20.		20 years & under 25.		25 years & under 35.		35 years & under 45.		45 years & under 55.		55 years & under 65.		65 years & under 75		75 years & under 85		85 years & over.		Persons.	Males.	Females.
	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.	M.	F.			
Europeans ...	4	6	2	—	—	—	—	—	—	—	1	—	—	1	—	—	4	—	6	—	6	4	9	1	7	1	1	—	1	3	—	—	57	41	16
Burghers ...	50	49	12	12	6	13	2	8	4	5	10	8	4	8	10	7	5	6	13	15	15	17	11	8	17	10	16	13	10	16	2	3	385	187	198
Sinhalese ...	407	411	143	128	101	104	52	72	43	38	80	117	72	79	102	77	116	142	282	227	225	177	184	127	181	101	130	74	101	69	63	56	4284	2282	2002
Tamils ...	180	144	45	29	21	22	23	26	16	9	36	38	33	16	56	24	79	43	151	95	144	63	77	38	70	25	41	29	23	18	16	19	1649	1011	638
Moors ...	166	154	38	50	26	25	12	15	11	5	16	22	27	19	34	25	43	25	54	40	53	39	41	26	44	13	33	28	37	20	30	35	1206	665	541
Malays ...	36	31	10	9	5	5	—	1	3	2	5	4	2	5	2	9	5	7	7	11	5	4	9	3	6	—	12	6	5	4	7	3	223	119	104
Others ...	25	13	5	3	1	6	1	3	—	1	5	3	3	2	13	2	26	1	85	6	47	4	11	3	11	—	6	3	2	1	3	1	296	244	52
All races ...	868	811	255	231	160	175	90	125	77	60	153	192	141	130	217	144	278	224	598	394	495	308	342	206	336	150	239	153	179	131	121	117	8100	4549	3551

No. 10.—Causes of Deaths Registered in Colombo during the year, 1920.

Causes of Deaths.	Colombo Town.	Ward.														Nationality.						
		Fort & Galle Face.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Hospitals.			Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
													Town Residents.	Untraced.	Non-Residents.							
All Causes ...	8100	—	—	—	—	—	—	—	—	—	—	—	—	—	—	57	385	4284	1649	1206	223	296
I. General Diseases :—																						
1. Epidemic Diseases...	1161	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	52	549	308	159	20	62
2. Septic Diseases ...	69	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	45	13	5	—	1
3. Tuberculous Diseases	769	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	24	443	153	92	20	33
4. Venereal Diseases ...	73	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	48	10	12	1	—
5. Cancer or Malignant Diseases ...	98	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	7	57	24	5	—	4
6. Other General Diseases ...	218	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	18	119	37	25	5	13
II. Diseases of the Nervous System and Organs of Special Sense ...	962	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	46	457	183	206	43	24
III. Diseases of the Circulatory System ...	167	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	13	86	34	22	—	5
IV. Diseases of the Respiratory System ...	1346	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	71	674	297	190	42	66
V. Diseases of the Digestive System ...	1180	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	61	710	220	126	21	33
VI. Non-venereal Diseases of the Genito-Urinary and Annexa ...	277	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	14	146	55	43	5	11
VII. The Puerperal State ...	113	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	62	22	16	3	3
VIII. Diseases of the Skin and of the Cellular Tissue ...	107	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	71	11	14	3	1
IX. Diseases of the Bones and of the Organs of Locomotion ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—
X. Malformations ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
XI. Diseases of Early Infancy	472	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	18	233	111	83	17	6
XII. Old Age ...	464	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20	219	75	115	27	8
XIII. Affections produced by External Causes ;—																						
1. Suicide ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	2	—	—	—	—
2. Homicide ...	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	3	2	—	1	1
3. Judicial Hanging or Execution ...	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	1	—	—	—
4. Accident and other External Violence	151	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	91	25	13	1	14
XIV. Ill-defined Diseases ...	444	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	13	256	67	80	14	11
I. GENERAL DISEASES *Epidemic Diseases.*																						
1. Enteric Fever ...	338	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	17	222	47	20	7	21
2. Typhus Fever ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
3. Relapsing Fever ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
4. *a* Malaria ...	31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	17	5	4	1	—
4. *b* Malarial Cachexia ...	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	9	—	2	1
5. Smallpox *a* Vaccinated ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Smallpox *b* Not Vaccinated	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
5. Smallpox *c* Doubtful ...	21	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	13	4	—	—	3
6. Measles ...	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	8	1	—	—	—
7. Scarlet Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Whooping Cough ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
9. *a* Diphtheria ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	1	—	—	—
9. *b* Membranous Laryngitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
9. *c* Croup ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
10. Influenza ...	253	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	13	90	81	54	3	11
11. Miliary Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
12. Asiatic Cholera ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
13. Cholera Nostras ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14. *a* Amœbic Dysentery ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—
14. *b* Bacillary Dysentery ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
14. *c* Dysentery (type not distinguished ...	260	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	13	145	64	15	6	14
15. Plague ...	209	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	37	94	65	1	11
16. Yellow Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
17. Leprosy ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
18. Erysipelas ...	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	4	1	—	—	—
19. *a* Mumps ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
19. *b* Varicella (Chickenpox) ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
19. *c* Other Epidemic Diseases...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Septic Dises. 20. *a* Pyæmia ...	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	1	1	—	—
Septic Dises. 20. *b* Septicæmia ...	57	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	35	12	4	—	1
Septic Dises. 20. *c* Vaccinia ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
21. Glanders ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
22. Anthrax ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
23. Rabies, Hydrophobia ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	1	—	—	—
24. Tetanus ...	65	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	26	18	9	2	7
25. Mycoses ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
26. Pellagra ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
27. Beri-Beri ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1

Causes of Deaths, &c.,—*contd.*

Causes of Deaths.	Colombo Town.	Ward														Nationality.						
													Hospitals.									
		Fort & Galle Face.	Pettah	San Sebastian.	St. Paul's	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension	Wellawatte Extension.	Town Residents	Untraced.	Non-Residents	Europeans	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
ALL CAUSES ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Tuberculosis Diseases.																						
28. *a* Acute Pulmonary Tuberculosis ...	726	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	22	421	142	86	20	31
28. *b* Chronic Pulmonary Tuberculosis ...	--	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
29. Acute Miliary Tuberculosis ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—
30. Tuberculous Meningitis.	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3	—	—	—
31. Abdominal Tuberculosis	6	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	3	—	—	—
32. Tuberculosis of the Spine ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33. Tuberculosis of Joints.	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—
34. Tuberculosis of other Organs (Lymphatism excepted) ...	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	14	5	4	—	2
35. Disseminated Tuberculosis ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—
36. Rickets ...	80	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	49	10	10	2	3
37. Syphilis ...	70	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	46	10	11	1	—
37*a*. Parangi (Frambœsia Tropicum, Yaws) ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
38. Gonococcus Infection ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—
Cancer or Malignant Diseases.																						
39. Cancer and other malignant Tumours of the Buccal Cavity ...	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	18	4	1	—	4
40. Cancer and other malignant Tumours of the Stomach, Liver ...	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	2	2	—	—
41. Cancer and other malignant Tumours of the Peritoneum, Intestines, Rectum ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	1	—	—
42. Cancer and other malignant Tumours of the Female Genital Organs	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	2	—	—	—
43. Cancer and other malignant Tumours of the Breast ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	1	—	—
44. Cancer and other malignant Tumours of the Skin ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—
45. Cancer and other malignant Tumours of other Organs or of Organs not specified ...	40	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	22	14	—	—	—
46. Other Tumours (Tumours of the Female Genital Organs excepted) ...	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	10	1	—	—	—
47. Acute Rheumatic Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48. *a* Rheumatoid Arthritis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48. *b* Osteo-Arthritis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
48. *c* Chronic Rheumatism ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	1	—
48. *d* Gout ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
49. Scurvy ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
50. Diabetes (Mellitus) ...	31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	19	3	4	—	1
51. Exophthalmic Goitre ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
52. Addison's Disease ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
53. *a* Leucocythæmia ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
53. *b* Lymphadenoma ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
54. *a* Anæmia ...	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	7	2	2	—	1
54. *b* Chlorosis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55. *a* Diabetes Insipidus ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55. *b* Purpura ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55. *c* Hæmophilia ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
55. *d* Other General Diseases ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
56. Alcoholism (acute or chronic)	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
57. Chronic Lead Poisoning ...	--	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
58. Other Chronic Poisonings (occupational) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
59. Other Chronic Poisonings (non-occupational) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
II. DISEASES OF THE NERVOUS SYSTEM AND OF THE ORGANS OF SPECIAL SENSE.																						
60. Encephalitis ...	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	1	—	—	1
61. *a* Simple Meningitis ...	33	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	14	5	1	2	4
61. *b* Cerebro-Spinal Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
61. *c* Septic Meningitis from various causes ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
62. Locomotor Ataxia ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
63. Other Diseases of the Spinal Cord ...	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	—	1	—	1

Causes of Deaths, &c.,—*contd.*

Causes of Deaths.	Colombo Town.	Ward.														Nationality.						
		Fort & Galle Face.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Hospitals.			Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
													Town Residents.	Untraced.	Non-Residents.							
ALL CAUSES	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
64. Cerebral Hæmorrhage Apoplexy	47	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	25	8	5	4	1
65. Softening of the Brain	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
66. Paralysis without special cause	101	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	62	12	14	4	—
67. General Paralysis of the Insane	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
68. Other forms of mental alienation	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—
69. Epilepsy	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	8	5	7	3	—
70. Convulsions (non-puerperal)	130	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	59	20	36	10	2
71. Convulsions of Infants	590	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	18	268	129	142	20	13
72. Chorea	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
73. Neuralgia and Neuritis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
74. Other Diseases of the Nervous System	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	3	—	—	—	2
75. Diseases of the Eyes and their Annexa	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
76. *a* Mastoid Disease	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
76. *b* Other Diseases of the Ears.	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
III. DISEASES OF THE CIRCULATORY SYSTEM.																						
77. Pericarditis	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	3	1	—	1
78. *a* Simple Acute Endocarditis	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	1	2	—	1
78. *b* Infective Endocarditis	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
79. *a* Myocarditis	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	—	—	—	—
79. *b* Valvular Disease	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	2	—	—	—
79. *c* Other Organic Diseases of the Heart	75	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	9	34	20	8	—	2
80. Angina Pectoris	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	4	—	5	—	—
81. *a* Aneurism	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—
81. *b* Atheroma, Arteriosclerosis.	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—
81. *c* Other Diseases of the Arteries	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	1	—	—	—
82. *a* Cerebral Embolism and Thrombosis	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	1	5	1	—	—	—
82. *b* Embolism and Thrombosis other than Cerebral	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	—	—	—	—
83. *a* Phlebitis	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—
83. *b* Varicose Veins	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
83. *c* Hæmorrhoids	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	—	3	—	—
83. *d* Other Diseases of the Veins	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
84. *a* Lymphatism, Status Lymphaticus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
84. *b* Elephantiasis Arabum (Filariasis)	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—
84. *c* Other Diseases of the Lymphatic System	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—
85. *a* Hæmorrhage from any part	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	4	—	—	1
85. *b* Other Diseases of the Circulatory System	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—
IV. DISEASES OF THE RESPIRATORY SYSTEM.																						
86. Diseases of the Nose	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
87. *a* Laryngismus Stridulus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
87. *b* All forms of Laryngitis (Diphtheritic excepted)	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—
87. *c* Other Diseases of the Larynx	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
88. Diseases of the Thyroid Body	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
89. Acute Bronchitis	109	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	47	16	25	7	5
90. *a* Chronic Bronchitis	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	9	9	18	2	2
90. *b* Bronchiectasis	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
91. Broncho-Pneumonia	522	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	33	291	102	71	18	4
92. Pneumonia	584	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	25	278	148	65	15	51
93. *a* Empyema	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	12	4	—	—	—
93. *b* Other Pleurisy	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	2	—	—	1
94. Pulmonary Congestion, Pulmonary Apoplexy	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	4	1	—	1
95. Gangrene of the Lungs	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	1	—	—	—
96. Asthma	32	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	16	6	9	—	—
97. Pulmonary Emphysema	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
98. Other Diseases of the Respiratory System (Tuberculosis excepted)	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	6	4	1	—	2

Causes of Deaths, &c.,—*contd.*

Causes of Deaths.	Colombo Town.	Ward.											Hospitals.			Nationality						
		Fort & Galle Face.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Town Residents.	Untraced.	Non-Residents.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
ALL CAUSES ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
V. DISEASES OF THE DIGESTIVE SYSTEM.																						
99. *a* Diseases of the Teeth and Gums (Oral Sepsis) ...	–	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Thrush, Stomatitis ...	16	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	11	—	2	2	—
c Parotitis (Septic) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
d Other Diseases of the Mouth and annexa ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
100. *a* Tonsillitis (other than Diphtheritic) ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
b Quinsy ...	–	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
c. Other Diseases of the Pharynx ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	2	—	—
101. Diseases of the Œsophagus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
102. Gastric Ulcer ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
103. *a* Gastritis, Gastric Catarrh	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	10	2	1	—	—
b Other Diseases of the Stomach (Cancer excepted)	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
104. & 105. *a* Epidemic Diarrhœa ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—
b Diarrhœa Infantile, Diarrhœa due to food ...	28	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	18	2	2	—	2
c Diarrhœa undefined ..	193	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	102	50	28	1	5
d Enteritis ...	340	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	22	189	70	37	11	10
e Gastro-enteritis ...	42	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	4	22	7	5	1	1
f Colic ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
g Intestinal Ulceration. Colitis ...	17	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	10	1	2	—	—
h Duodenal Ulcer ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	1
106. Anchylostomiasis ...	170	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	129	30	7	—	3
107. Intestinal Parasites ...	165	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	106	22	21	5	4
108. Appendicitis and Typhlitis	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	6	2	4	—	—
109. *a* Hernia ...	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1	3	—	—
b Intestinal Obstruction ...	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	6	4	2	—	1
110. *a* Psilosis (Sprue or Ceylon Sore-mouth) ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—
b Other Diseases of the Intestine ...	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	1	2	1	1
111. Acute Yellow Atrophy of the Liver ...	10	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	7	2	—	—	—
112. Hydatid Tumour of the Liver ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
113. *a* Cirrhosis of the Liver (Alcoholic) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Cirrhosis of the Liver (Toxic) ...	36	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	19	8	4	—	1
114. Gallstones	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
115. Other Diseases of the Liver	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	19	3	—	—	3
116. Diseases of the Spleen ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—
117. Peritonitis (cause unknown)	56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	35	12	4	—	1
118. Other Diseases of the Digestive System (Cancer and Tuberculosis excepted)	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	1	—	—	—
VI. NON-VENEREAL DISEASES OF THE GENITO-URINARY SYSTEM AND ANNEXA.																						
119. Acute Nephritis ...	176	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	87	40	34	4	7
120. Bright's Disease ...	56	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	35	9	6	—	2
121. Chyluria ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
122. Other Diseases of the Kidneys and Annexa ...	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	9	3	2	1	2
123. Urinary Calculi ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
124. Diseases of the Bladder ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—
125. Diseases of the Urethra. Urinary Abscess, &c ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
126. Diseases of the Prostate ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
127. Diseases of the Male Genital Organs (non-venereal)...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	—
128. Uterine Hæmorrhage (non-puerperal)	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—
129. Uterine Tumour (non-cancerous) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
130. Other Diseases of the Uterus	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	5	2	—	—	—
131. Cysts and other Tumours of the Ovary ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—
132. Salpingitis and other Diseases of the Female Genital organs ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	—	—	—	—
133. Non-puerperal Diseases of the Breast (Cancer excepted) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—

Causes of Deaths, &c.,—*contd.*

Causes of Deaths.	Colombo Town.	Ward.														Nationality.						
													Hospitals.									
		Fort & Galle Face.	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Town Residents.	Untraced.	Non-Residents.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
ALL CAUSES	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VII. THE PUERPERAL STATE																						
134. *a* Abortion, Miscarriage	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	1	—
b Ante-partum Hæmorrhage	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
c Ectopic Gestation	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
d Other Accidents of Pregnancy	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	4	—	—	—
135. Puerperal Hæmorrhage	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—
136. Other accidents of Childbirth	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	7	1	—	—	—
137. Puerperal Septicæmia	50	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	29	9	7	2	1
138. *a* Puerperal Albuminuria, Nephritis, &c.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Puerperal Eclampsia	18	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	11	4	1	—	—
139. *a* Puerperal Phlegmasia, Alba Dolens	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Puerperal Embolism, Sudden Death, &c.	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
140. *a* Puerperal Insanity	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Consequences of Childbirth (not otherwise defined)	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	11	4	7	—	2
141. Puerperal Diseases of the Breast	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VIII. DISEASES OF THE SKIN AND OF THE CELLULAR TISSUE.																						
142. Gangrene	31	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	26	2	1	—	1
143. *a* Carbuncle	7	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1	1	1	—
b Furuncle (Boil)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
144. *a* Phlegmon	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—
b Acute Abscess, Abscess unqualified	15	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	10	2	1	1	—
145. *a* Ulcer, Bedsore	24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	18	3	2	—	—
b Eczema	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
c Pemphigus	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
d Other Diseases of the Integumentary System (Elephantiasis Arabum excepted)	26	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	11	2	9	1	—
IX. DISEASES OF THE BONES AND OF THE ORGANS OF LOCOMOTION.																						
146. Diseases of the Bones (Tuberculosis and Mastoid Disease excepted)	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
147. Diseases of the Joints (Tuberculosis and Rheumatism excepted)	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—
148. Amputations	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
149. Other Diseases of the Organs of Locomotion	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
X. MALFORMATIONS.																						
150. *a* Congenital Hydrocephalus	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Congenital Diseases of the Heart	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
c Other Congenital Malformation (Stillbirths excluded)	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
XI. DISEASES OF EARLY INFANCY.																						
151. *a* Premature Birth	60	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	5	28	11	11	1	—
b Debility	336	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	164	81	61	15	5
c Want of Breast Milk	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	2	3	—	—
d Atrophy, Icterus, Sclerema Neonatorum	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	1	—	—	1
152. *a* Atelectasis	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	8	—	1	—	—
b Injuries at Birth	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
c Other Diseases peculiar to early Infancy	9	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	4	4	—	—	—
153. Lack of care	41	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	21	12	7	1	—
XII. OLD AGE.																						
154. Senility	464	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	20	219	75	115	27	8

Causes of Deaths, &c.,—*contd.*

Causes of Deaths.	Colombo Town.	Ward														Nationality.						
		Fort & Galle Face	Pettah.	San Sebastian.	St. Paul's.	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Hospitals.			Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
													Town Residents.	Untraced.	Non-Residents.							
ALL CAUSES ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
XIII. AFFECTIONS PRODUCED BY EXTERNAL CAUSES.																						
155. Suicide by Poison ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
156. Suicide by Asphyxia ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
157. Suicide by Hanging or Strangulation ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	—	—	—
158. Suicide by Drowning ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—
159. Suicide by Firearms ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	—	—
160. Suicide by Cutting or Piercing Instruments ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
161. Suicide by Jumping from high places ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
162. Suicide by Crushing ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
163. Suicide by other means ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
164. Poisoning by Food ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	3	—	—	—	—
165. *a* Snake-bite ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
b Insect Stings (Venomous)	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
c Other Acute Poisonings...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	—
166. Conflagration ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
167. Burns (Conflagration excepted) ...	23	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	15	4	2	—	1
168. Absorption of Deleterious Gases (Conflagration excepted) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
169. Accidental Drowning ...	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1	14	6	3	—	2
170. Traumatism by Firearms...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
171. Traumatism by Cutting or Piercing Instruments ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1	—	—	—
172. *a* Traumatism by Fall from trees ...	8	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	4	1	—	—	3
b Traumatism by Fall from heights other than trees.	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
c Traumatism by other Accidental Fall ...	5	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	2	2	—	—	—
173. Traumatism in Mines and Quarries ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
174. Traumatism by Machines...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
175. Traumatism by other Crushing (Vehicles, Rail-road. Landslides, &c.) ...	24	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	13	5	2	1	3
176 Injuries by Animals ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
177. Starvation ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
178. Excessive Cold ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
179. Effects of Heat ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
180. Lightning ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
181. Electricity (Lightning excepted ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
182. Homicide by Firearms ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
183. Homicide by Cutting or Piercing Instruments ...	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	—	1
184. Homicide by other means...	4	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	2	—	—	—
185. Fractures (cause not specified) ...	35	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	21	5	4	—	3
186. *a* Judical Hanging or Execution ...	12	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	1	—	—	—
b Other External Violence.	14	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	11	1	1	—	1
XIV. ILL-DEFINED DISEASES.																						
187. *a* Dropsy ...	11	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	10	1	—	—	—
b Ascites ...	3	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	2	—	1	—	—
c Other Ill-defined Organic Diseases ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1
188. *a* Syncope ...	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—
b Sudden Death (not otherwise defined) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
189. *a* Heart-failure ...	27	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	3	11	7	4	—	1
b Atrophy, Debility, &c.. (one year and over) ...	158	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	94	29	28	4	2
c Teething ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
d Pyrexia ...	43	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	23	10	8	—	1
e Marasmus and Asthenia.	185	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	9	106	19	38	9	4
f Other Ill-defined Causes...	13	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	9	1	—	1	1
g Diseases not specified ...	2	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1

No. 11.—INFANT MORTALITY 1920, BY WARDS.

Rate per 1,000 births.

Ward.	Average 1910 to 1919.	1920.	Increase or decrease.
Colombo	274	233	— 41
Fort	239	500	+261
Pettah	311	567	+256
San Sebastian	346	299	— 47
St. Paul's	388	409	+ 21
Kotahena	277	218	— 59
New Bazaar	358	305	— 53
Maradana	326	261	— 65
Slave Island	290	274	— 16
Kollupitiya	220	206	— 14
Eastward Extension	274	244	— 30
Wellawatte Extension	209	186	— 23
Hospitals	153	122	— 31

No. 12.—INFANT MORTALITY 1920, BY RACE.

Rate per 1,000 births.

	All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
All causes	233	145	196	194	333	312	238	314
Premature birth	8	58	10	7	11	11	4	—
Atrophy & debility	56	—	32	45	94	75	57	83
Bronchitis	7	—	8	5	7	9	18	16
Pneumonia	25	14	26	22	31	31	28	8
Diarrhoeal	22	29	47	22	16	11	28	33
Convulsions	82	—	36	64	133	138	71	108
Tetanus	2	—	—	2	6	1	4	—
All other causes	31	44	37	27	35	36	28	66

No. 13.—Infant Mortality.

Deaths at different age periods and from several causes, 1920.

Cause of Death.	Age.													Race.							
	Age in Weeks.					Age in Months.															
	1	2	3	4	Total.	2	3	4	5	6	7-9	10-12	Total.	Europeans	Burghers.	Sinhalese.	Tamil.	Moors.	Malays.	Others.	All races.
I. Developmental Diseases—																					
1. Premature birth ...	54	1	2	2	59	1	—	—	—	—	—	—	1	4	5	28	11	11	1	—	60
2. Atalectasis ...	10	—	—	—	10	—	—	—	—	—	—	—	—	—	2	7	—	1	—	—	10
3. Atrophy and debility ...	166	29	19	29	243	50	34	16	15	10	19	14	158	—	16	191	91	77	16	10	401
4. Others ...	2	1	1	2	6	4	4	1	1	4	5	2	21	1	2	12	4	4	2	2	27
II. Diseases of respiratory system																					
1. Laryngitis ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Croup ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Bronchitis ...	2	—	—	2	4	9	6	5	6	5	8	5	44	—	4	21	7	9	5	2	48
4. Pneumonia ...	1	1	4	3	9	15	21	14	19	21	48	33	171	1	13	95	30	32	8	1	180
5. Others ...	—	—	—	—	—	—	—	—	—	—	1	1	2	—	—	2	—	—	—	—	2
III. Diseases of digestive system—																					
1. Diarrhœal ...	1	1	3	8	13	20	22	17	15	12	42	19	147	2	24	95	16	11	8	4	160
2. Dentition ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Others ...	1	6	6	5	18	13	13	4	2	2	5	3	42	—	4	31	13	8	3	1	60
IV. Diseases of nervous system—																					
1. Convulsions ...	153	66	43	33	295	83	64	28	25	20	53	22	295	—	18	268	129	142	20	13	590
2. Laryngismus stridulus ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
3. Tetanus ...	12	5	—	—	17	—	—	—	—	—	—	—	—	—	—	9	6	1	1	—	17
4. Others ...	3	—	—	—	3	—	1	—	—	—	—	—	1	—	1	3	—	—	—	—	4
V. Tuberculous diseases—																					
1. Tabes messenterica ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Tubercular meningitis ...	—	—	—	—	—	—	—	1	—	—	2	1	4	—	3	—	—	—	1	—	4
3. Others ...	—	—	—	—	—	—	—	—	—	—	2	—	2	—	—	2	—	—	—	—	2
VI. Accidents—																					
1. Injury ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
2. Umbilical hæmorrhage ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
3 Suffocation ...	1	—	—	—	1	—	—	—	—	—	—	—	—	—	—	—	—	—	—	1	1
4. Other violence ...	3	—	1	—	4	—	—	—	—	—	—	—	—	—	—	3	1	—	—	—	4
VII. Infectious diseases—																					
1. Small-pox ...	—	—	—	—	—	—	—	—	—	—	1	—	1	—	—	1	—	—	—	—	1
2. Chicken-pox ...	—	—	—	1	1	—	—	—	—	—	—	—	—	—	—	1	—	—	—	—	1
3. Measles ...	—	—	—	—	—	—	—	—	—	—	—	1	1	—	—	—	1	—	—	—	1
4. Whooping cough ...	—	—	—	—	—	1	—	—	—	—	—	—	1	—	1	—	—	—	—	—	1
5. Mumps ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
6. Diphtheria ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
7. Cerebro-spinal fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
8. Scarlet fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
VIII. Syphilis—	2	—	1	3	6	7	9	4	3	—	3	1	27	—	—	19	5	9	—	—	33
IX. All other causes—	2	2	2	3	9	10	8	1	6	8	11	15	62	2	6	32	10	15	2	4	71
Total ...	414	112	82	91	699	213	182	91	92	82	200	117	980	10	99	821	321	320	67	38	1679

No. 14.—PRINCIPAL CAUSES OF DEATHS AT ALL AGES IN 1920.

Cause		Deaths	
Pneumonia		1106	Total Pulmonary—1985.
*Phthisis		729	
Bronchitis		150	
Diarrhœa	605	223	Total Diarrhœal—868.
Enteritis		382	
Dysentery		263	
*Enteric Fever		338	All Fevers—414.
Remittent Fever		31	
Intermittent Fever		2	
*Simple & ill-defined Fever.		43	
Debility		494	
Influenza		253	
Infantile Convulsions		590	

CERTAIN MINOR CAUSES OF DEATHS.

Cause	Deaths
Anchylostomiasis	170
Intestinal parasites	165
Paralysis	101
Rickets	80
*Plague	209
Cancer	98
Tetanus	65
Syphilis	70
*Measles	9
*Diphtheria	5
*Whooping cough	2
Rabies	5
*Smallpox	21
Beri-beri	1

* Those marked with an asterisk are notifiable.

No. 15.—NOTIFIABLE INFECTIOUS DISEASES, 1920.

Diseases.	January.	February.	March.	April.	May.	June.	July.	August.	September	October.	November.	December.	Total for Colombo exclusive of Port and outside cases.	Port.	Outside.	Grand total of cases.
Plague ...	25	20	3	3	4	3	12	7	18	28	34	78	235	—	4	239
Cholera ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Smallpox ...	—	—	—	1	1	—	—	—	32	24	10	7	75	21	18	114
Chickenpox ...	60	71	180	60	34	22	14	22	45	59	46	26	639	15	9	663
Measles ...	220	219	236	115	68	66	31	27	21	25	19	15	1062	4	12	1078
Diphtheria ...	—	1	2	—	2	1	1	—	—	—	—	—	7	—	5	12
Acute Diarrhœa ...	1	—	1	—	1	—	—	1	—	—	—	—	4	—	—	4
Enteric Fever ...	63	46	52	46	70	44	67	53	69	68	53	46	677	21	181	879
Continued Fever ...	20	14	10	4	18	13	18	15	15	17	10	8	162	—	5	167
Phthisis ...	150	180	105	113	123	113	86	116	91	100	97	87	1361	5	286	1652
Scarlet Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
Typhus Fever ...	—	—	—	—	—	—	—	—	—	—	—	—	—	1	—	1
Total ...	539	551	589	342	321	262	229	241	291	321	269	267	4222	67	520	4809

No. 16.—PULMONARY DISEASES 1920. BY RACE.

Rate per 1,000 population.

Disease.		All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Phthisis	Deaths ...	729	4	22	424	142	86	20	31
	Death-rate ...	2·62	1·03	1·20	3·39	2·11	1·75	2·89	3·89
Pneumonia	Deaths ...	1106	5	58	569	250	136	33	55
	Death-rate ...	3·97	1·28	3·17	4·55	3·70	2·77	4·76	6·91
Bronchitis	Deaths ...	150	—	10	56	25	43	9	7
	Death-rate ...	·54	—	·55	·45	·37	·88	1·30	·87
All Pulmonary	Deaths ...	1985	9	90	1049	417	265	62	93
	Death-rate ...	7·13	2·31	4·92	8·39	6·18	5·40	8·95	11·67

No. 17.—DEATH-RATES FROM PULMONARY DISEASES IN 1909, 1917, 1918, 1919 AND 1920. CALCULATED ON CENSUS POPULATION.

Race.	MALES.					FEMALES.				
	1909.	1917.	1918.	1919.	1920.	1909.	1917.	1918.	1919.	1920.
Burghers ...	7·56	7·51	9·47	8·56	6·46	9·12	6·89	10·84	7·61	6·88
Sinhalese ...	11·49	7·08	12·94	11·56	11·17	11·23	8·16	14·59	11·95	11·13
Moors ...	10·26	3·89	7·65	5·71	5·29	13·59	5·72	11·87	8·79	9·79
Malays ...	9·45	6·70	11·28	7·05	9·87	15·06	9·89	15·43	9·10	15·45
All races ...	11·39	6·19	10·46	9·35	8·64	11·96	7·69	13·75	10·55	10·59

No. 18.—DIARRHŒAL DISEASES 1920.—BY RACE,

Rate per 1,000 Population.

Diseases.		All Races.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Diarrhœa & Enteritis ...	Deaths ...	605	3	37	332	130	72	13	18
	Death-rate ...	2·17	·77	2·02	2·66	1·92	1·46	1·88	2·26
Dysentery ...	Deaths ...	263	3	14	146	65	15	6	14
	Death-rate ...	·94	·77	·77	1·17	·96	·31	·87	1·75
All Diarrhœal ...	Deaths ...	868	6	51	478	195	87	19	32
	Death-rate ...	3·11	1·54	2·79	3·83	2·88	1·77	2·75	4·01

No. 19.—FEVERS 1920. CASES, DEATHS AND RATES PER 1,000 POPULATION OF EACH RACE.

Diseases.		All Racaes.	Europeans.	Burghers.	Sinhalese.	Tamils.	Moors.	Malays.	Others.
Enteric fever ...	Cases ...	879	31	81	554	95	51	11	56
	Case-rate ...	3·15	7·96	4·43	4·43	1·41	1·04	1·59	7·03
	Deaths ...	338	4	17	222	47	20	7	21
	Death-rate ...	1·21	1·03	·93	1·78	·70	·41	1·01	2·63
Continued fever ...	Cases ...	167	—	13	105	26	13	4	6
	Case-rate ...	·60	—	·71	·84	·38	·26	·58	·75
	Deaths ...	43	1	—	23	10	8	—	1
	Death-rate ...	·15	·26	—	·18	·15	·16	—	·13
Remittent fever ...	Deaths ...	31	2	2	17	5	4	1	—
	Death-rate ...	·11	·51	·11	·13	·07	·08	·14	—
Intermittent fever ...	Deaths ...	2	—	—	2	—	—	—	—
	Death-rate ...	·007	—	—	·02	—	—	—	—
All Fevers ...	Cases ...	1046	31	94	659	121	64	15	62
	Case-rate ...	3·75	7·96	5·14	5·27	1·79	1·30	2·17	7·78
	Deaths ...	414	7	19	264	62	32	8	22
	Death-rate ...	1·48	1·80	1·04	2·11	·92	·65	1·15	2·76

No. 20.—FEVERS BY WARDS, 1920.

Cases and case-rate per 1,000 population.

Disease.	Colombo.	Fort & Galle Face	Pettah.	San Sebastian.	St. Paul's	Kotahena.	New Bazaar.	Maradana.	Slave Island.	Kollupitiya.	Eastward Extension.	Wellawatte Extension.	Port.	Outside.	Untraced.
Enteric Fever.															
Cases ...	879	5	4	19	43	142	61	115	54	73	31	26	21	181	104
Case-rate ...	3·15	1·12	·40	1·29	1·37	2·76	2·15	2·07	1·93	2·30	2·24	2·82	—	—	—
Continued Fever.															
Cases ...	167	—	1	2	9	39	17	32	11	14	11	9	—	5	17
Case-rate ...	·60	—	·10	·14	·29	·76	·60	·58	·34	·44	·79	·98	—	—	—
All Fevers.															
Cases ...	1046	5	5	21	52	181	78	147	65	87	42	35	21	186	121
Case-rate ...	3·75	1·12	·50	1·43	1·66	3·52	2·75	2·65	2·27	2·74	3·03	3·80	—	—	—

No. 21.—ENTERIC CASES REPORTED DURING 1920.

Inclusive of Port and Outside cases. Distribution by Race, Age and Sex.

Race.	Sex.	0 to 5 years	5 to 10 "	10 to 15 "	15 to 20 "	20 to 25 "	25 to 30 "	30 to 35 "	35 to 40 "	40 to 50 "	50 to 60 "	60 & over.	All Ages.	Total of each race.	Case rate per 1,000 population.	Deaths.	Case mortality per cent.	Mortality per 1,000 population.
All races ...	M	22	43	84	95	101	70	40	37	34	18	4	518	879	3·15	3·38	38·5	1·21
	F	18	48	62	68	44	25	20	17	17	7	5	331					
Europeans ...	M	1	—	1	—	4	7	5	2	2	2	—	24	31	7·96	4	12·9	1·03
	F	—	—	—	—	2	2	1	2	—	—	—	7					
Burghers ...	M	2	2	4	7	7	4	1	1	6	1	—	35	81	4·43	17	21·0	·93
	F	4	8	8	6	5	8	—	2	3	—	2	46					
Sinhalese ...	M	16	29	55	62	55	34	22	23	18	9	1	324	554	4·43	222	40·1	1·78
	F	12	33	46	51	32	13	16	11	7	7	2	230					
Tamils ...	M	—	7	9	12	16	5	5	7	2	3	2	68	95	1·41	47	49·5	·70
	F	1	2	4	9	2	1	1	2	4	—	1	27					
Moors ...	M	2	2	12	8	3	4	—	—	3	—	1	35	51	1·04	20	39·2	·41
	F	1	4	2	2	2	1	2	—	2	—	—	16					
Malays ...	M	—	3	2	1	—	1	—	—	—	1	—	8	11	1·59	7	63·6	1·01
	F	—	—	1	—	1	—	—	—	1	—	—	3					
Others ...	M	1	—	1	5	16	15	7	4	3	2	—	54	56	7·03	21	37·5	2·63
	F	—	1	1	—	—	—	—	—	—	—	—	2					

No. 22.—PLAGUE 1914 TO 1920.

	1914.	1915.	1916.	1917.	1918.	1919.	1920.
Total cases ...	413	139	291	207	70	87	235
Total deaths ...	381	128	273	196	69	82	223
Septicæmic cases ...	*247*	*81*	*159*	*124*	*41*	*50*	*93*
Septicæmic deaths ...	246	80	159	124	41	50	93
Bubonic cases ...	*166*	*58*	*132*	*83*	*29*	*37*	*142*
Bubonic deaths ...	135	48	114	72	28	32	130
Total case mortality % ...	92·2	92·8	93·8	94·7	98·6	94·3	94·9
Septicæmic case mortality % ...	99·6	98·7	100·0	100·0	100·0	100 0	100·0
Bubonic case mortality % ...	81·3	82·8	86·4	86·7	96·6	86·5	91·5
Per cent Septicæmic ...	59·8	58·0	54·6	59 9	58·5	57·5	39·6
Per cent Bubonic ...	40·2	42·0	45·4	40·1	41·5	42·5	60·4

No. 23.—PLAGUE 1920. CASES REPORTED.

Monthly Incidence.

Month.	Plague cases.	Mean temperature.	Rainfall inches.	Mean humidity per cent.
January ...	25	79·0	0·83	78
February ...	20	79·7	3·36	78
March ...	3	81·4	5·95	80
April ...	3	81·2	14·77	82
May ...	4	83·0	8·68	81
June ...	3	80·8	17·44	84
July ...	12	80·7	2·54	82
August ...	7	80 8	0·94	80
September ...	18	80·8	2·04	80
October ...	28	80·4	15 27	82
November ...	34	79 4	14·49	84
December ...	78	78·6	4·42	78
	235	80·5	90·73	81

No. 24.—PLAGUE CASES, 1920.

Rate per 1,000 living at each age period. Calculated on Census Population.

Age period.	No. of cases.	Case rate.
0 to 5 years ...	3	·15
5 years to 10 years ...	11	·52
10 " 15 " ..	27	1·09
15 " 20 " ...	50	2·10
20 " 25 " ...	40	1·48
25 " 30 " ...	33	1·33
30 " 35 " ...	19	1·04
35 " 40 " ..	14	1·01
40 " 50 " ...	25	1·42
50 " 60 " ...	9	·84
60 years and over ...	4	·46
All ages ...	235	·54

No. 25.—PLAGUE CASES, 1920.

Distribution by Race, Age and Sex.

Race.	Sex.	0 to 5 years	5 to 10 ,,	10 to 15 ,,	15 to 20 ,,	20 to 25 ,,	25 to 30 ,,	30 to 35 ,,	35 to 40 ,,	40 to 50 ,,	50 to 60 ,,	60 & over.	All Ages.	Total of each race.	Case rate per 1,000 population.	Deaths.	Case mortality per cent.	Mortality per 1,000 population.
All races ...	M	1	6	19	47	38	30	19	13	21	7	3	204*	235	·84	223	94·9	·80
	F	2	5	8	3	2	3	—	1	4	2	1	31†					
Europeans ...	M	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
	F	—	—	—	—	—	—	—	—	—	—	—	—					
Burghers ...	M	—	—	—	—	—	—	—	—	—	—	—	—	1	·06	1	100·0	·06
	F	—	—	—	—	—	—	—	1	—	—	—	1					
Sinhalese ...	M	—	1	2	9	3	6	2	1	3	2	2	31	44	·35	41	93·2	·32
	F	2	2	3	2	1	1	—	—	1	1	—	13					
Tamils ...	M	—	2	7	22	20	18	9	7	11	2	—	98	103	1·53	98	95·1	1·45
	F	—	1	1	—	1	1	—	—	1	—	—	5					
Moors ...	M	1	2	8	15	13	4	6	4	6	3	—	62	74	1·51	71	95·9	1·45
	F	—	2	4	1	—	1	—	—	2	1	1	12					
Malays ...	M	—	1	1	—	—	—	—	—	—	—	—	2	2	·29	2	100·0	·29
	F	—	—	—	—	—	—	—	—	—	—	—	—					
Others ...	M	—	—	1	1	2	2	1	1	1	—	1	11	11	1·38	10	90·9	1·26
	F	—	—	—	—	—	—	—	—	—	—	—	—					

* 1·36 per 1,000 Males. † ·33 per 1,000 Females.

No. 26 PLAGUE, 1920.

Distribution by Wards.

Ward.	Cases.	Deaths.
Fort ...	—	—
Pettah ...	26	25
San Sebastian ...	18	18
St. Paul's ...	65	63
Kotahena ...	12	12
New Bazaar ...	13	13
Maradana ...	32	30
Slave Island ...	29	27
Kollupitiya ...	11	9
Eastward Extension ...	3	3
Wellawatte Extension ...	—	—
Vagrants & unknown ...	26	23
TOTAL ...	235	223

Bubonic.

Cases ...	112
Deaths ...	130

Septicæmic.

Cases ...	93
Deaths ...	93

Case Mortality per cent.

All Cases ...	94·9
Bubonic ...	91·5
Septicæmic ...	100·0

No. 27.—STATEMENT COMPILED FROM THE MONTHLY RETURNS FURNISHED BY THE VETERINARY SURGEON SHOWING THE NUMBER OF RATS TRAPPED AND FOUND DEAD.

Month.	Number of rats trapped.	Number of dead rats found.	Total.
January ..	8218	—	8218
February ...	8876	3	8879
March ...	9588	—	9588
April ...	8109	—	8109
May ...	7223	—	7223
June ...	7146	—	7146
July ...	8868	—	8868
August ...	9005	—	9005
September ...	9562	12	9574
October ...	10796	2	10798
November ...	10644	5	10649
December ...	8798	3	8801
TOTAL	106833	25	106858

No. 28.—Municipal Bacteriological Laboratory.

Rat Examinations 1920.

Month.	No. of rats examined.	No. found infected.	Percentage Infection.
January	1993	33	1·65
February	1695	23	1·35
March	1539	4	·26
April	1460	—	—
May	1356	1	·07
June	1486	3	·20
July	1827	22	1·20
August	1546	6	·39
September	1743	5	·29
October	1831	3	·16
November	1789	22	1·22
December	2098	15	·74
Total	20363	137	0·67

No. 29.—Vaccinations preformed during 1920.

(*a*) By Government Vaccinators.

Ward.	Primary Vaccinations.	Re-vaccinations.	Total.
Fort, Galle Face, Pettah and San Sebastian	585	986	1571
St. Paul's	902	325	1227
Kotahena	1109	112	1221
New Bazaar	634	809	1443
Maradana	800	1649	2449
Slave Island	617	596	1213
Kollupitiya	804	220	1024
Eastward Extension	821	305	1126
Itinerating (Colombo)	312	—	312
Total	6584	5002	11586

(*b*) By Municipal Vaccinators.

Ward.	Primary Vaccinations.	Re-vaccinations.	Total.
Fort	3	119	122
Pettah	46	1737	1783
San Sebastian	—	18	18
St. Paul's	237	3231	3468
Kotahena	61	576	637
New Bazaar	9	54	63
Maradana	27	77	104
Slave Island	116	2541	2657
Kollupitiya	67	785	852
Eastward Extension	8	189	197
Wellawatte Extension	1	9	10
Total	575	9336	9911

No. 30.—Work done by Ward Inspectors during 1920.

	Nature of Work.	Fort and Galle Face.	Pettah	San Sebastian	St. Paul's	Kotahena North	Kotahena South	New Bazaar	Maradana North	Maradana South	Slave Island	Kollupitiya E.	Kollupitiya W.	Eastward Extension	Wellawatte Ext.	Total.
1	No. of Inspections ...	3207	4681	2468	2987	3504	2378	3349	1942	3010	2870	1342	2543	3204	4121	41606
2	No. of premises in which sanitary defects were found (*a*) non-structural ...	103	221	194	231	135	175	248	233	91	324	165	203	65	144	2532
3	No. of premises in which sanitary defects were found (*b*) structural ...	45	67	57	59	65	38	32	87	64	107	13	59	17	35	745
4	No. of premises where non-structural defects were rectified	64	175	165	134	136	86	153	114	67	245	161	138	32	103	1773
5	No. of premises where structural defects were rectified ...	33	53	14	45	72	3	19	50	30	26	—	12	4	26	387
6	No. of insanitary dwellings structurally improved ...	2	6	11	5	9	2	—	36	9	19	3	11	8	12	133
7	No. of buildings other than dwellings, structurally imprd.	1	27	28	24	70	11	3	38	18	70	29	13	13	14	359
8	No. of insanitary dwellings closed under Plague Regulations	—	—	—	—	—	1	—	20	1	—	—	—	—	—	22
9	No. of insanitary dwellings remaining closed at end of year (total.) ...	—	1	8	78	52	2	—	22	1	11	—	—	—	—	175
10	No. of insanitary dwellings demolished ...	—	—	—	—	—	3	1	14	—	1	1	—	—	—	20
11	No. of insanitary premises in which plans have been called for ...	—	—	—	1	—	—	—	5	—	2	—	—	—	1	9
12	No. of insanitary dwellings included in (11) ..	—	—	—	25	—	—	—	70	—	27	—	—	—	10	132
13	No. of insanitary premises in which plans have been recd.	—	—	2	—	—	—	74	69	—	—	—	—	—	3	148
14	No. of insanitary premises condemned and referred to W. E. for improvement ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
15	No. of insanitary dwellings included in (14) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
16	No. of insanitary premises scavg. by P.H.D. cleansing gang.	80	20	18	96	66	190	98	486	197	285	3	63	27	22	1651
17	No. of dwellings pesterined ...	680	61	75	352	—	59	103	125	183	1215	5	—	15	—	2873
18	No. of dwellings claytonised ...	903	1284	711	1988	3	468	554	381	687	1855	23	11	64	—	8932
19	No. of dwellings un-roofed ...	680	20	15	130	—	18	56	12	152	1193	—	—	15	—	2291
20	No. of rat-holes found, claytonised and filled up ...	1810	6894	3085	8162	23	2392	3029	1613	2795	4475	496	57	314	—	35145
21	No. of dwellings disinfected ...	127	40	83	249	181	244	195	247	202	159	75	137	75	123	2137
22	No. of dwellings limewashed ...	442	356	744	1212	76	212	928	482	136	1181	14	104	27	152	6066
23	No. of wells filled up ...	—	—	—	1	—	2	—	1	—	1	4	2	—	9	20
24	No. of cesspits filled up ...	—	—	3	6	3	—	3	4	—	—	1	—	—	1	21
25	No. of notices served under Section 1. Sub-section (1) of Ordinance No 15 of 1862 (Filthy premises) ...	32	57	40	78	37	51	62	138	54	74	19	84	16	75	817
26	No. of notices served under Section 186 of Ordinance No. 6 of 1910 (Privy accommodation) ...	—	—	—	—	16	5	—	3	—	1	13	—	—	1	39
27	No. of notices served under Section 189 of Ordinance No. 6 of 1910 (Filling up of stagnant pools, &c.) ...	—	—	—	1	—	—	—	—	—	1	3	1	—	3	9
28	No. of notices served under Section 178 of Ordinance No. 6 of 1910 (Cleansing and Limewashing) ...	29	162	43	65	1	8	57	54	25	101	10	25	13	52	645
29	No. of notices served under Section 49, Part I of Plague Regulations (closure of buildings U. H. H) ...	—	—	—	—	—	1	—	5	1	—	—	—	—	—	7
30	No. of notices served under By-law 8 (1) Chapter XXII (Improvement to buildings U. H. H.) ...	1	2	2	2	1	2	—	—	—	—	—	—	—	1	11
31	No. of notices served under Section 38, Part I of Plague Regulations (Filling up wells) ...	—	—	—	—	2	2	—	1	—	—	5	1	—	—	11
32	No. of notices served under Section 39, Part I of Plague Regulations (Overcrowding) ...	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
33	No. of prosecutions ...	96	158	210	206	129	112	163	267	113	246	128	113	68	110	2119
34	No. of convictions ...	94	147	197	194	125	96	159	243	107	225	119	104	63	113	1986
35	No. of cases acquitted, withdrawn or otherwise dealt with .	1	10	9	13	3	5	5	19	6	9	4	4	3	5	96
36	No. of cases pending at end of year ...	1	—	2	6	—	12	9	8	—	5	4	2	—	8	57
37	Amount of fines Rs.	482·50	857·75	1160·50	4270·0	629·25	827·0	775·0	1633·0	582·75	1153·0	1019·0	648·50	337·50	660·0	15035·75

No. 31.—PROSECUTIONS—DETAILS.

Ordinance or By-law.	Offence.	No. of Cases.	No. of Convictions.
Section 1 Sub-sec. 1 of Ord. 15 of 1862	Filthy premises	712	674
„ 1 „ 1 „ 15 „	Filthy dairy	32	28
„ 1 „ 1 „ 15 „	Filthy ærated water factory	2	2
„ 1 „ 1 „ 15 „	Filthy laundry	5	5
„ 1 „ 2 „ 15 „	Foul privy	8	5
„ 1 „ 4 „ 15 „	Nuisance by cattle, swine, &c.	57	54
„ 1 „ 9 „ 15 „	Selling unwholesome food	11	10
„ 39 of Ord. 1 of 1896	Unregistered dairy	12	12
„ 53 Chapter 3 of Ord. 1 of 1896	Unregistered laundry	31	24
„ 29 of Ord. 9 of 1899	Putting up placards on walls of General Cemetery	1	1
„ 110 „ 6 of 1910	Spitting in market	8	4
„ 178 „ 6 „	Failure to limewash	77	62
„ 188 „ 6 „	Neglect to provide privy accommodation	19	17
„ 189 „ 6 „	Failure to fill up abandoned well	3	2
„ 194 „ 6 „	Abuse of roadside by children	23	20
„ 205 „ 6 „	Failure to report infectious diseases	18	18
„ 212 „ 6 „	Unlicensed offensive trades	9	8
Rule 29 of Chapter VIII By-laws	Digging pits without permission	3	2
„ 31 „ VIII „	Throwing rubbish on roadside	9	8
„ 4 „ IX „	Filthy bathing well	9	8
„ 4 „ XI „	Dwelling house used as bakery	2	1
„ 7 „ XI „	Filthy eating house	67	67
„ 7 „ XI „	Filthy bakery	26	24
„ 8 „ XI „	Unclean workmen in bakery	2	2
„ 11 „ XI „	Unregistered bakery	1	1
„ 11 „ XI „	Unregistered eating house	5	5
„ 36 „ XII „	Slaughtering animals without license	1	—
„ 3*d* „ XIII „	Misbehaving in public market	26	24
„ 3*h* „ XIII „	Occupation of portion of market other than stall	3	3
„ 9 „ XIII „	Selling meat without license	5	5
„ 10 „ XIII „	Filthy meat board, chopping block etc. in stall	1	1
„ 11 „ XIII „	Filthy stall	87	87
„ 23 „ XIII „	Exposing for sale fowls near drain of public market	2	2
„ 31 „ XIII „	Keeping stall closed without permission	17	14
„ 34 „ XIII „	Obstruction of passages in public market	120	114
„ 2*a* „ XIV „	Exposing food to dust and flies	318	299
„ 3 „ XIV „	Sale of adulterated milk	184	180
„ 5 „ XIV „	Refusing sample of milk	3	3
„ 7 „ XIV „	Unlicensed milk vendor	177	171
„ 7 „ XIV „	Unregistered kneaders in bakery	3	—
Reg. made on Sec. 26 part 1 of Ord. 3 of 1897	Failure to report infectious diseases	17	16
„ 43 1 „ 3	Moving about in public with small-pox	3	3
	Total	2119	1986

No. 32.—WORK DONE AT THE DISINFECTING STATION DURING, 1920.

Month.	No. of pieces disinfected.	No. of loads.
January	259	12
February	269	13
March	235	9
April	118	10
May	407	10
June	118	10
July	199	10
August	162	5
September	1249	17
October	775	14
November	765	10
December	598	14
Total ...	5154	134

NO. 33.—ANTI-MOSQUITO WORK.

(1) *Complaints from House-holders.*

Number of complaints received	79
do premises visited	363
do potential breeding places found	19,668
do actual breeding places found	1,530

(2) *General Inspection work.*

Number of premises inspected	1,707
do tenements inspected	4,770
do potential breeding places found	70,730
do actual breeding places found	2,377

(3) *Summary.*

Number of complaints received	79
do premises inspected	2,070
do tenements inspected	4,770
do potential breeding places found	90,398
do actual breeding places found	3,907

NO. 34.—DAMAGED FOODSTUFFS CONDEMNED, 1920.

	Cwt.	Qr.	Lbs.
Fish	—	—	17
Beef	—	—	7½
Dates	—	3	16
Tea	—	2	9
Flour	—	—	— 2½ bags.
Barley	—	—	— 15 „
Potatoes	—	—	— 232 „ & 45 lbs.
Onions	—	—	— 6 baskets.

Food-stuffs Condemned at Customs.

Potatoes	1415½ bags.
Rice	763 „ & 4 tons.
Dry-fish	20 „
Onions	100 „
Garlic	2 „
Dhal	42 „
Grain	3 „

At Chalmer's Granaries.

Rice	11 bags & 2 bushels

At Pettah Warehouse.

Rice	190 bags.
Potatoes	2011 „

NO. 35.—REGISTERED TRADES, 1920.

	No. on Register at end of previous year.	No. discontinued during the year under review.	New registrations during the year.	Total on register at end of year.
Dairies	44	14	13	43
Bakeries	41	3	9	47
Laundries	308	15	29	322
Eating-house	395	51	94	438
Ærated water factories	14	1	—	13
Opium divans	—	—	—	—

NO. 36.—SLAUGHTER HOUSE.

Number of cattle slaughtered	26,694
„ sheep and goats slaughtered	67,914
„ pigs slaughtered	3,872
„ cattle rejected before slaughter	357
„ cattle rejected owing to poor condition	322
„ sheep and goats rejected before slaughter	1
„ cattle rejected after slaughter	—
„ pigs rejected before slaughter	—

No. 37.—WORK DONE BY THE MUNICIPAL MIDWIVES, 1920.

Number of confinements attended	772
,, children born	779
,, still-births	37
,, deaths within two weeks	13
Death-rate exclusive of still-births...	1·67%

No. 38.—WORK DONE AT THE MUNICIPAL ENTERIC HOSPITAL, 1920.

Number of patients remaining from previous year	9
,, admissions during the year	65
,, deaths	13
Number discharged cured	50
Case mortality per cent	17·6

No. 39.—STATEMENT SHOWING THE NUMBER OF RATS CAUGHT, ETC., IN THE TOWN DURING THE YEAR, 1920.

Month.	Number of traps placed.	Number of rats caught.	Number per 100 cages.
January	53,158	8,218	15
February	49,730	8,879	17
March	53,077	9,588	18
April	51,112	8,109	15
May	46,934	7,223	15
June	34,423	7,146	20
July	35,544	8,868	24
August	35,484	9,005	25
September	34,406	9,574	27
October	35,452	10,798	30
November	34,540	10,649	30
December	35,662	8,801	24
TOTAL	499,522	106,858	21·39

No. 40.—STATEMENT SHOWING THE NUMBER OF RATS CAUGHT, ETC., AT PLAGUE-INFECTED AREAS DURING THE YEAR, 1920.

(Statement supplied by the Municipal Veterinary Surgeon.)

Month.	No. of rat traps placed.	No. of rats caught.	No. of rats per 100 cages.	No. of poison baits placed.	No. of Poison baits removed or eaten.	Percentage of Poison baits removed.
January	80,276	8,311	10	164,025	3,730	3
February	76,944	6,454	8	81,200	4,733	6
March	22,112	1,883	9	27,400	1,156	5
April	7,229	668	9	14,600	789	6
May	1,544	63	4	1,200	36	3
June	6,578	851	13	17,010	981	6
July	7,824	1,344	17	22,000	720	4
August	23,229	5,285	23	3,200	32	1
September	12,992	2,509	19	12,550	670	6
October	37,354	9,504	25	61,450	3,517	6
November	28,310	7,267	22	35,225	2,108	6
December	100,445	19,378	19	128,810	3,269	3
TOTAL	404,837	63,517	15·68	568,670	21,741	3·82